STAR POINT MINES

MINING
AND
RECLAMATION PLAN

PLATEAU MINING CO.

PAP UPDATE REGISTER

MINE NAME — FILE NUMBER

Star Point — ACT/007/006

DATE REC.	PAGE NO.	PLATE NO.	APPROVAL DATE	INSERT BY	CONTENTS/REMARKS AMENDMENT NO.
	7-86 ~~7-86~~		10/13/90	T. Monso	
	7-86A				
	TABLE 8 of 21				
10/15/90	817-17a, 17b		11/19/90	S. White	
~~11/3~~/19/90		Exhibit 36		pgl	Reclamation agreement signed 11/28/90
Closed 11/27/90		Table 69			with revised figures Mid-Term Review
1/10/91	817-3a to 817-3c1	Table 95	1/4/91	JBE	Updated amendment 90D BTCA Designations
1/16/91	Table 67		1/15/91	JBE	Existing Structures
1/16/91	Sheet F-12	Map 44	1/15/91	JBE	Surface Facilities Map
6-7-91	Sheet F-12	Map 44	6-13-91	JE	Surface Facilites Map
6-7-91	Table 67		6-13-91	JE	Existing Structures
6-20-91	DRAWING #1			JM	CONCRETE HOLDING BASIN FOR DIESEL TANKS
7/31/91	map 42		7/31/91	JE	surface & water sedimentation Control Facilites Map A & B
	pg2	Table 67	1/15/91	JE	Existing Structures
8/26/91	map 44		9/12/91	JE	Lump Coal Bin (Item 77) added to map Surface Facilities
8/26/91		Table 67	9/12/91	Jess Kelley	Item 77 (Lump Coal Bin) added to table.
12-5-91	782-16a	—	11-8-91	JE	Deed
12-5-91		maps 2,3,6,7	11-8-91	JE	Surface Ownership; Permit Area Coal Ownership; Mine Plan
1/92	771			JD	Prefix update

AT45/4
REV. 1/90

00699

CYPRUS PLATEAU MINING CORP.
MRP MID TERM UPDATE

2-20-90
2-21-90
D. GRIME:

1/6

PAGES REPLACED	DESCRIPTION
~~INTRO - 1, 2 & 3~~	FOUND IN SECTION 771
✓ LIST OF TABLES	
✓ LIST OF FIGURES	
✓ LIST OF EXHIBITS	
✓ LIST OF MAPS	
✓ 782-23 REV 11/20/88	DOGM PAGE REV 12/15/86
✓ 783-41 & 42	MISSING IN DOGM MRP SET
✓ 784-20 REV 2/10/90	UPDATE TO INCLUDE STIP. RESOLUTION
✓ 784-52c REV 5/7/87	MISSING
✓ 784-52d " 4/15/87	MISSING
✓ 784-65 " 2/10/90	UPDATE TO INCLUDE STIP. RESOLUTION
↓ THROUGH	
✓ 784-77	
✓ 784-79 REV 2/15/88	
✓ 784-80 " 2/10/88	
↓ THROUGH	
✓ 784-88a REV 2/10/90	UPDATE TO INCLUDE STIP. RESOLUTION
✓ 784-116 REV 2/10/90	UPDATE " " " "
↓ THROUGH	
✓ 784-130	
✓ 784-147 REV 2/10/90	UPDATE TO INCLUDE STIP. RESOLUTION
✓ 817-0 " 11/20/88	MISSING
✓ 817-0a " "	
✓ 817-0b " "	
✓ 817-0c " "	

817-3d REV 4/18/89 THROUGH		MISSING ↓
817-3h REV 4/18/89		
817-7a " 2/10/90		
817-7b " "		
817-17 " "		
817-17a " "		
817-19a " 4/26/89 THROUGH		MISSING ↓
817-19c REV 4/20/89		
817-23 REV 2/3/90		UPDATE TO INCORPORATE STIP
817-24 " "		" " " "

EXHIBITS -* STARTED AT END TO FIT EVERYTHING IN ADDITIONAL 3 RING BINDERS.

55. ADDED CORRESPONDENCE
54. ADDED MAY 10, 1988 LETTER & CALCS. & CORRESPONDENCE ON ASCAS
50 ADDED - FROM BOX
49 ADDED - FROM BOX
48 " " "
47 " " "
46 " " "
45 " " "
44 ADDED " "
ADDED RB&G JULY 30, 1987 LETTER
" " OCT 16, 1987 "

EXHIBITS

43 ADDED FROM BOX

37 ADDED COPY OF RENEWED NPDES PERMIT

20 ADDED 11-20-86 SCS LETTER & 11-10-86 PMC LETTER W/MAP. (NEW LABELS)

2 ADDED COPY OF LATEST INSURANCE CERTIFICATE

FIGURES STARTED AT END TO AID IN FITTING FIGURES INTO VOLUME SET

44 ADDED - FROM BOX
43 " " "
42 " " "
41 " " "
39 MISSING - ADDED
38 " "
37 REVISED COPIES REPLACED - FROM BOX
34 " " " " "
32 " " " " "
29 " " " " "
28 " " " " "
25 " " " " "
20 MISSING - REPLACED W- COPY FROM MY SET

TABLES STARTED AT END TO AID IN FITTING TABLES INTO VOLUME SET

95 REPLACED W/REV 1-24-90 VERSION FROM MY SET
90 REPLACED W/LATEST REVISION 10-14-87 FROM MY SET

TABLES (CONTINUED)

89 REPLACED WITH LATEST SUBSIDENCE DATA (INCLUDING 1989 MONITORING)

87 REVISED COPY REPLACED - FROM BOX

86 " " " " "

82 " " " " "

64 ADDED LATEST REVISION - MISSING

54 " " " - MISSING

56 " " " - "

15 " " " - "

* SEND 2 COPIES OF ALL MAPS

5/6

MID-TERM MAP REVIEW

HIGHLIGHTED MAPS NEED TO BE SENT TO DOGM TO BE INSERTED IN MRP SET

MAP NO		DESCRIPTION
2		REPLACED W/REV 8-23-89 FROM BOX
4		(3-88) - LATEST REVISION - MINE PLAN MAP (UPDATED YEARLY) MISSING
5	5 & 6 WILL BE REVISED TO SHOW 1989 WORKINGS BY 3-31-90	CHECK MAP AT MINE REVISED IN 1989 TO SHOW 88 WORKINGS - DOGM COPY IS 2-88 REVISION - SEND COPY TO DOGM
6		CHECK MAP AT MINE - REVISED IN 89 TO SHOW 88 WORKINGS - DOGM COPY IS 12/88 REVISION - SEND COPY TO DOGM
25		MISSING - SEND COPY TO DOGM
42	3 OF 3	MISSING - SEND COPIES TO DOGM
43	3 OF 3	1 & 3 OF 3 MISSING SEND COPIES TO DOGM
44	SHEET E-12	ALL HAVE BEEN REVISED - SEND COPIES TO DOGM
	" E-13	
	" F-12	
	" G-12	
49	1 MAP IN DOGM MRP SET	CROSS SECTIONS C-C, D-D, E-E & F-F
	LIST OF MAPS SHOWS 2 OF 2 MAPS - SEEM TO BE MISSING SECTIONS A-A & B-B - CHECK & SEND COPIES OF MISSING MAP	
50	7 OF 7	REPLACED OLD MAP 50 WITH COPIES FROM BOX
61	WILL BE REV BY 3-31-90	LATEST REVISION 12-89 IS MISSING SEND NEW COPY
74 ↓ 79		ALL MISSING SEND DOGM COPIES

MID-TERM UPDATE

REARRANGED VOLUMES TO INCORDORATE ALL STIPULATION RESOLUTIONS - INCLUDING NEW MAPS, TABLES, FIGURES AND EXHIBITS.

MRP VOLUMES CONTAIN THE FOLLOWING:

VOL 1	-	TEXT
VOL 2	-	TABLES - ALL
VOL 3	-	FIGURES - ALL
		EXHIBITS - 1-6
VOL 4	-	EXHIBITS - 7-22
VOL 5	-	EXHIBITS - 23-36
VOL 6	-	EXHIBITS - 37-47
VOL 7	-	EXHIBITS - 48-END
VOL 8	-	CONFIDENTIAL MATERIALS
VOL 9	-	MAPS 1-34
VOL 10	-	MAPS 35-54
VOL 11	-	MAPS 55-73
VOL 12	-	MAPS 74 - END

MRP Update Register

Mine Name File Number

PLATEAU ACT/007/006

Date Rec.	Page #s	Plate #s	Approval Date	Insert By	Content/Remarks
9/29/86				pgl	Entire 7 volumes delivered to DOGM
10/17/87	784-127	Exhibit 42		TM	work & file Copies
10/30/87	All required changes for Renewal				
	all	sheet		pgl	
12/10/87	784-16a & 0	Table 67 MAP 44 E-12 E-13	12/9/87	pgl	work & file Copies
12/31/87	783-128 784-111	Table 70	5-yr approval	pgl	
12/31/87	TABLE of Contents	LIST of TABLES LIST of Figures LIST of EXHIBITS LIST of MAPS		pgl	New Lands Update
					Compiled into 5 year plan
	INTRO-1,2,3 771-2, 771-5, 771-6, 771-8, 782-5, 782-8				
	771-17, 782-13, 782-15, 782-16, 782-16a, 782-17 782-20, 782-20a, 782-21, 782-22, 782-23, 782-25				
	782-27, 783-1, 783-2, 783-3, 783-4, 783-4a 783-8, 783-66, 783-66a, 783-114, 783-122				
	783-122a, 783-143, 783-146, 784-3, 784-4				
	784-4a, 784-59, 784-62, 62a, 62b, 62c, 784-74a				
	784-80, 784-81, 784-82, 82a, 784-92, 92a, 784-93, 784-94, 94a, 94b, 784-105, 784-106, 106a, 784-109, 784-110, 110a, 110b, 110c, 784-121, 784-122, 122a, 784-129, 784-135, 784-136, 136a, 784-138, 784-139, 784-140, 140a 784-143, 784-145a, 145a1, 145a2, 146a, 146b, 785-3				

MRP Update Register

Mine Name PLATEAU File Number ACT/007/006

Date Rec.	Page #s	Plate #s	Approval Date	Insert By	Content/Remarks
12/31/87		MAP 1, (Sheets 1, 2, & 3)		pgl	
		MAP 2, MAP 3, MAP 4, 5, 6,			
		25, 26, 27, 29, 30, 31,			
		32, 33, 34 (sheet 5, 6, 8)			
		35 (sheet 9) 36 (sheet 4)			
		37, 38, 39 (Sheet 5, 8)			
		40 (sheet 9) 41 (sheet 4)			
		42, 43, 44 (sheet E-12, F-12)			
		45, 47 (sheet E-12) 47 (sheet F-12)			
		61, 61C (sheet 10) 62, 65 (1 & 2)			
		71, 72, 73 (sheet 4, 9) Confidential			
		Map 7, 8, 9, 10, 11, 12, 13			
		14, 15, 16, 17, 18, 19, 20, 21			
		22, 23, 24			

P A P UPDATE REGISTER

MINE NAME	FILE NUMBER
PLATEAU	ACT/007/006

DATE REC.	PAGE #s	PLATE #s	APPROVAL DATE	INSERT BY	CONTENT/REMARKS
1/10/89	817-3, 3a, 3b, 3c, 4	Table 95 MAP 42, 67, 68, 71	1/10/89	pgl	
1/25/89	78-122, 122a, 784-62a, 784-62b,		1/11/89	pgl	
1/25/89	784-62c, 784-62d, 784-62e		1/11/89	pgl	
1/25/89	784-90 784-91, 79a, 784-110		1/11/89	pgl	
1/25/89	784-136, 784-139	EXHIBIT 53	1/11/89	pgl	
1/25/89		Plate 3, 5, 6 61	1/11/89	pgl	
2/22/89		Plate 31 Table 80	2/10/89	pgl	
3/17/89	1 page		3/16/89	BS	Amendment to eagle and cliff subsidence monitoring
6.19.89	TABLE 67, 68, 69 EXHIBIT 36 MAP 44		6.13.89	pgl	#0070089 B New shop building
March 31/89	Ex 19-14 Ex. 19-18 Ex 19-19 Ex 19-20 P784-26a P784-26b	Map 38 Map 39 Sheets 5+6			
7/14/89	~~BREAK SEAL~~ EXHIBIT 43		7/14/89	TM	BREAKOUT SEAL TMINE H2O RETURN TO NFRF MILLERCR

MRP UPDATE RECORD

Mine Name: Star Point Mine **File #:** ACT/007/006

MRP Approval Date: _____ Mid-Term approval: _____

Rev. #	Date Received	Stipulated Approval Date	Final Approval Date	Insert In MRP	Comments
	July 1987	Exhibit 4 Addendum	B. Stettler	7/28/89	New Lands Cultural Resource Inventory.
	March 1987	Exhibit 41	B. Stettler	7/28/89	Eagle nest monitoring plan
89O	7/28/89	~~7/31/89~~	T. Munson	7/31/89	REFUSE PILE DITCH + CUL. CALCS.
89O	7/28/89	7/31/89	T. Munson	7/31	TABLES 76 + 77, MAP 42 A+B
89H		9/28/89	T. munson	9/28	TEXT 817-3A,B,C, TABLE 95 MAP 42,67,68
89G		10/2/89	RUS	10/2/89	MATERIALS ENCompanying Exhibit 55
	11/1/89	PERMIT Defect	pgl	11/3/89	Plate 44 - F-12 Plate 71 Plate 47 - E-13
Stipulation Response 817.101-(1)-(PGL)					
	pg. 817-19d and -19e and				Exhibits 44 (Those geotechnical
					investigations dated
					11/15/89, 2/84, 1/84, & 1/83.
	9-27-89		5-3-90	5-3-90	MAP 42 - 1 of 3, 2 of 3, & 3 of 3
Mid-Term Updates, Rcvd 2/26/90, Inserted 5/15/90					
					~~Map~~ Map 25, 42, (all 3 of 3), 43, (2 of 3)
					43 (3 of 3), 49 (2), Map 74 (1 of 2)
					74 (2 of 2), 75, 76, 77

Mine Name:		File #:
Rev. #	Page Numbers	Plate Numbers

Attached to this letter is a verification statement as required by UMC 771.27.

Sincerely,

John J. Spiecha
Vice President and General Manager

JJS/BG/kam

Attachments

cc: Bob Lauman
Ben Grimes
File: ENV 2-5-2-12

I the undersigned, hereby certify that the material and information contained in this Application for Permit Renewal (ACT/007/006) are complete and correct to the best of my knowledge and belief.

PLATEAU MINING COMPANY

By: John J. Spiecha

John J. Spiecha
Vice President & General Manager

State of Utah
County of Carbon

Subscribed and sworn to and before me this 26TH day of Sept., 1986.

Jackie D. Boode

Notary Public for the State of Utah

My Commission Expires: 3-15-89

PERMIT RENEWAL APPLICATION
FOR

STAR POINT MINES
MINING AND RECLAMATION PLAN

VOLUME I

Submitted by:
Plateau Mining Company
P.O. Drawer PMC
Price, Utah 84501

September 1986

INTRODUCTION

Plateau Mining Company (PMC), a wholly owned subsidiary of Cyprus Western Coal Equipment Company, is submitting the attached material as a new permit application as required by Section 40-10-9 of the Utah Code Annotated 1953, and in compliance with the Underground Mining Codes.

This new information covers five new parcels of property recently acquired by coal lease modification, coal reserves purchase, and surface land purchases, hereinafter referred to as "new lands". These new lands are to be added to our existing permit ACT/007/006.

No new surface disturbances are planned for these new parcels. All pertinent parts of the regulations have either been addressed in the permit renewal of September 29, 1986 or have been addressed with the addition of this information.

Information addressing parts UMC 783 on Environmental Resources, UMC 784 on Reclamation and Operation Plan, UMC 771, UMC 782, UMC 785, and UMC 805 was included in the September 29, 1986 submittal. The information in that submittal covered the substantial part of that required for the new lands. This submittal adds all other information required to add the new parcels to our present permit.

The permit term for this application is for five years.

The permit boundary has been changed on the appropriate maps to include the new lands. To simplify and block out by 40 acre legal land subdivisions, the permit boundary has been modified in the surface operations area to include some of the new lands and areas previously included within our permit boundary that had irregular shapes.

Geographic Setting

PMC's Star Point Mines are located on the east side of the Wasatch Plateau Coal Field approximately 10 miles west of Price, Utah, at an elevation of 8500 feet above sea level. Location of the mine permit boundary is presented

on Figure 1, Location Map. The surface operations are located at the end of County Road 50 and are located within Carbon County. A portion of the Permit Area lies within Emery County, but no surface facilities exist there.

Size and Nature of Operations

PMC expects to mine approximately 2 million tons of coal per year for the next 20 years. This figure could reach as high as 3.0 million tons per year if the market dictates.

PMC is an underground mine with the capability of expanding its reserves to the north and south as unleased federal coal reserves become available.

The existing permit consists of 6149.17 acres; the new permit area covered by this application is 7200.52 acres, of which 6919.40 acres are in fee land, coal leases, a special use lease agreement and rights of way.

Socioeconomic Impacts

Coal mining in Carbon and Emery Counties has been conducted since before the turn of the century. Historically, mining in the area has fluctuated with the economy. The boom in mining of the 1970's was in response to high oil prices. Since then, production of coal has dropped substantially and the economy of the area has suffered.

PMC has been a stable organization providing good quality coal at a fair price. The workforce has been stable with between 230 to 300 people employed over the past five years. Current projections indicate a continuation of this trend with some hope of increasing employment to the 300 range within the next five years. PMC will substantially benefit the local and state economy by continuing to be a steady source of tax revenue.

Since PMC is an underground mine located in a remote setting that has been mined since the early part of the century, the impacts to adjacent property owners will be minimal. The continuation of PMC operations will have little or no effect on Carbon or Emery County social and technical services because the work force is stable and the economy of the area has stabilized.

The material submitted herein demonstrates PMC's moral and legal commitments that have been made to the citizens of the area and to the State of Utah. PMC will utilize the most current technology available to prevent or mitigate the adverse impacts generally associated with mining. PMC will minimize environmental damage by adhering to the mining and reclamation plans approved by the regulatory authorities.

Permit Organization and Format

This permit application is in the regulation/response format and was assembled in response to the Coal Mining and Reclamation Permanent Program Chapter I as revised September 20, 1982. Where individual regulations have been suspended by court action, this submittal is appropriately responsive. The most current Division of Oil, Gas and Mining (DOGM) Guidelines have been used in evaluating environmental consequences and in establishing monitoring plans. Responses to Part UMC 784 incorporate response to Part 817 Performance Standards. This minimizes redundancy and reduces the volume of material to be reviewed.

All modifications, and additions to the existing permit, as well as monitoring data gathered over the past 5 years have been incorporated into this permit application to make it a stand-alone document, eliminating the need to refer to numerous past submittals. Changes to matters set forth in the original permit application are outlined in response to UMC 788.14(a)(1).

Confidential information will be referred to as such in responses to specific regulations. The reader will be referred to a separate volume where this information can be found. Copies of this permit application placed on file at public places will not include the confidential volume. Please contact DOGM or PMC management for access to confidential material.

At the request of the DOGM, part UMC 788 will be left in the permit application document to serve as a record of the five year permit renewal process. The new information for the "new lands" is to be added to the September 29, 1986 submittal.

TABLE OF CONTENTS

* * * * * *

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

No. Title

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

No. Title

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF EXHIBITS

No. Title

Revised 2-10-90

LIST OF EXHIBITS (Continued)

No.	Title
28.	Thickener Underflow Design Details (7 maps)
29.	NPDES Discharge Water Quality Data Summaries
30.	Prediction of Subsidence Due to Two-Seam Longwall Mining in Section 18
31.	Sedimentation Pond Approval, Documentation and Certification
32.	Pond Detention Calculations
33.	Star Point Mines Refuse Pile Expansion - Operation and Monitoring Plan
34.	Air Quality Approval Correspondence
35.	Reclamation Bond
36.	Bond Calculations
37.	NPDES Permit
38.	Refuse Pile Stability Analysis
39.	Resource Recovery and Protection Plan Approvals
40.	An Annotated Literature Review on the Effects of Mulching on Surface Disturbances Associated with Reclamation in the Western States with Emphasis on Plant Establishment Water and Wind Erosion
41.	Golden Eagle Cliff Nesting and Subsidence Monitoring and Mitigation Plan
42.	Sediment Pond No. 2 Energy Dissipation Structure
43.	Water Rights Mitigation Plan
44.	Static Safety Factor on Reclaimed Areas Investigation
45.	Riprap Calculations
46.	Culvert Capacity Calculations
47.	Pond Inlet and Outlet Design Calculation
48.	Pond 9 Calculations
49.	Diversion Ditch and Culvert Peak Flow Calculations

LIST OF EXHIBITS (Continued)

No. Title

50. Reclamation Channel Calculations

51. An Evaluation of the Toxic and Acid Forming Properties of Overburden and Coal Refuse Materials

52. Response to Initial Completeness Review Comment UMC 784.14(a)(1) Permit Renewal - August 1987

53. Hydrologic Response to Land Subsidence Caused by Underground Coal Mining, Miller Creek Drainage, Carbon County, Utah

54. Hydrologic Modifications

55. Exploration Permits

LIST OF MAPS

No.	Title
1.	Pre-Law Mining Activity - Hiawatha Seam
	Pre-Law Mining Activity - Third Seam
	Pre-Law Mining Activity - Wattis Seam
2.	Surface Ownership
3.	Coal Ownership and Cultural Resource Survey Areas
4.	Mine Plan - Hiawatha Seam
5.	Mine Plan - Third Seam
6.	Mine Plan - Wattis Seam
7.	Hiawatha Seam Isopach
8.	Third Seam Isopach
9.	Wattis Seam Isopach
10.	Hiawatha Seam Floor Lithology
11.	Hiawatha Seam Roof Lithology
12.	Hiawatha Seam Structure
13.	Hiawatha Overburden Isopach
14.	Third Seam Floor Lithology
15.	Third Seam Roof Lithology
16.	Third Seam Structure
17.	Third Seam Overburden Isopach
18.	Interburden Isopach Third to Hiawatha Seam
19.	Seam Correlations Wattis, Third, Hiawatha
20.	Wattis Seam Floor Lithology
21.	Wattis Seam Roof Lithology
22.	Wattis Seam Structure
23.	Wattis Seam Overburden Isopach
24.	Interburden Isopach Wattis to Third Seam
25.	Inventoried Seeps and Springs and Surface Geology
26.	Ground and Surface Water Quality Sampling Stations with Water Quality Data
27.	Piezometric Surface-Regional Aquifer System
28.	In-Mine Flow Monitoring Sites and Tributary Areas

Revised 02-10-90

LIST OF MAPS (Continued)

No.	Title
29.	*Stream Survey - North Fork Right Fork Miller Creek
30.	*Ground Water Rights
31.	*Ground and Surface Water Monitoring Stations
32.	*Surface Water Rights Location Map
33.	*Permit Area Vegetation
34.	*Disturbed Area Vegetation - Sheet 5
	*Disturbed Area Vegetation - Sheet 6
	*Disturbed Area Vegetation - Sheet 8
35.	*Gentry Mountain Shaft Site Vegetation
36.	*Corner Canyon Fan Site Vegetation
37.	*Wildlife Land Use
38.	*Permit Area Soils
39.	*Disturbed Area Soils - Sheet 5
	*Disturbed Area Soils - Sheet 6
	*Disturbed Area Soils - Sheet 8
40.	*Gentry Mountain Shaft Site Soils
41.	*Corner Canyon Fan Site Soils
42.	*Surface Water and Sedimentation Control Facilities - Map A
43.	*Surface Water and Sedimentation Control Facilities - Map B
44.	*Surface Facilities - Sheet E-12
	Surface Facilities - Sheet E-13
	*Surface Facilities - Sheet F-12
	Surface Facilities - Sheet G-12
45.	*Graben Crossing Plan
46.	Graben Crossing Tunnels
47.	*Post-Disturbance Topography and Cross Section Locations - Sheet E-12
	Post-Disturbance Topography and Cross Section Locations - Sheet E-13
	*Post-Disturbance Topography and Cross Section Locations - Sheet-F-12
48.	Plateau Unit Train Loadout Pre-Disturbance and Post-Disturbance Cross Sections
49.	Reclamation Cross Sections
50.	Lower Yard Drainage - Map A

LIST OF MAPS (Continued)

No. Title

50. Post Mining Channel Reclamation - 7 of 7
51. Deleted
52. Channel Transition and Energy Dissipator From Ditch No. 14 into Existing Natural Channel
53. Design Details for Treatment Facility No. 1
54. Design Details for Sedimentation Pond No. 2
55. Design Details for Sedimentation Pond No. 3
56. Design Details for Sedimentation Pond No. 4
57. Design Details for Sedimentation Pond No. 5
58. Design Details for Sedimentation Pond No. 6
59. Design Details for Sedimentation Pond No. 7
60. Design Details for Sedimentation Pond No. 8
61. Subsidence Monitoring Plan - Map A
61C. Subsidence Monitoring Plan - Map C
62. Subsidence Monitoring Plan - Map B
63. PMC Conveyers 1 and 2 Loadout
64. Typical Cross Section Through Overland Conveyer
65. Deleted - Replaced by Maps 44 & 47
66. Deleted - Replaced by Maps 44 & 47
67. Mud Water Canyon Reclamation Plan
68. Corner Canyon Reclamation Plan
69. Mine Access Road Cross Sections - Map A
70. Mine Access Road Cross Section - Map B
71. Mine Permit Area
72. Spring - Mining Correlation
73. Revegetation Plan - Sheet 5
    Revegetation Plan - Sheet 6
    Revegetation Plan - Sheet 8
74. Road (A) Profile and Cross Sections - 2 of 2
75. Road (B) Profile and Cross Sections
76. Road (C) (D) (E) (F) (G) Profile and Cross Sections
77. Road (H) (I) (J) (K) Profile and Cross Sections
78. Reclamation Map 2 of 2

Pam reads to mine Plan after noting amendment
ACT/007/006 #2
Copy [redacted]

Mr. Lowell P. Braxton
Associate Director, Mining
Division of Oil, Gas and Mining
3 Triad, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: Request for Permit Change STAR POINT MINES Mine, ACT/007/006, CARBON County, Utah

As a result of a recent change in the Utah Administrative Code, the prefix R614 (the Utah Coal Regulatory Program) will be replaced by the new prefix R645. This is a prefix change only. The section/subsection citations balance of the rules governing the Coal Regulatory Program remains unchanged.

In order to accurately reflect this change in the above-cited Mining and Reclamation Plan, please consider this letter an application for a Permit Change as provided for at R645(614)-303-220. The prefix R645 replaces prefix R614 in all portions of the approved permit.

Approval of this Permit Change by the Division of Oil, Gas and Mining will obviate the need to change this prefix in each portion of the permit until other circumstances require submission of a rewritten permit.

Signed

CYPRUS PLATEAU MINING CORP.
Company

1-27-92
Date

RECEIVED
JAN 29 1992
DIVISION OF
OIL GAS & MINING

PART UMC 771 - GENERAL REQUIREMENTS FOR PERMITS AND PERMIT APPLICATIONS

UMC 771.1 SCOPE

THIS PART ESTABLISHES GENERAL CRITERIA FOR PERMITS AND PERMIT APPLICATIONS REQUIREMENTS WHICH ARE APPLICABLE TO OBTAINING THE SECRETARY'S APPROVAL OF REGULATORY PROGRAMS.

UMC 771.2 OBJECTIVES

THE OBJECTIVES OF THIS PART ARE TO INSURE THAT ALL UNDERGROUND COAL MINING ACTIVITIES ARE CONDUCTED ONLY UNDER PERMITS ISSUED IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY PROGRAM, THAT ALL PERSONS MAKE TIMELY APPLICATION FOR PERMITS, TO PROVIDE GENERAL REQUIREMENTS ON PERMIT FEE SYSTEMS, AND TO PROVIDE THE GENERAL CONTENTS REQUIREMENTS OF PERMIT APPLICATIONS.

UMC 771.11 GENERAL REQUIREMENTS FOR PERMITS - OPERATORS

EXCEPT AS PROVIDED FOR IN SECTION UMC 771.13(B), ON AND AFTER 8 MONTHS FROM THE DATE ON WHICH THE REGULATORY PROGRAM IS APPROVED BY THE SECRETARY, NO PERSON SHALL ENGAGE IN OR CARRY OUT UNDERGROUND COAL MINING ACTIVITIES ON NON-FEDERAL OR NON-INDIAN LANDS WITHIN THE STATE, UNLESS THAT PERSON HAS FIRST OBTAINED A VALID PERMIT ISSUED BY THE DIVISION UNDER AN APPROVED REGULATORY PROGRAM.

UMC 771.13 CONTINUED OPERATION UNDER INTERIM PERMITS

(A) IN THE EVENT OF THE FINAL DISAPPROVAL OF THE STATE PROGRAM UNDER 30 CFR 732, INCLUDING JUDICIAL REVIEW OF THE DISAPPROVAL, AND PRIOR TO THE PROMULGATION OF A COMPLETE FEDERAL PROGRAM FOR A STATE UNDER 30 CFR 736.11(A), EXISTING UNDERGROUND COAL MINING ACTIVITIES MAY CONTINUE PURSUANT TO THE PROVISIONS OF SECTION 502 OF THE FEDERAL ACT AND SUBCHAPTER B OF 30 CFR

CHAPTER VII DURING THIS PERIOD, NO NEW PERMITS FOR UNDERGROUND COAL MINING ACTIVITIES SHALL BE ISSUED BY THE STATE. PERMITS WHICH LAPSE DURING THIS PERIOD MAY CONTINUE IN FULL FORCE AND EFFECT WITHIN THE SPECIFIED PERMIT AREA, UNTIL PROMULGATION OF A FEDERAL PROGRAM FOR THE STATE. PERMITS WHICH LAPSE DURING THIS PERIOD MAY CONTINUE IN FULL FORCE AND EFFECT WITHIN THE SPECIFIED PERMIT AREA, UNTIL PROMULGATION OF A FEDERAL PROGRAM FOR THE STATE.

(B) A PERSON CONDUCTING UNDERGROUND COAL MINING ACTIVITIES, UNDER A PERMIT ISSUED OR AMENDED BY THE DIVISION IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 502 OF THE FEDERAL ACT, MAY CONDUCT THESE ACTIVITIES BEYOND THE PERIOD DESCRIBED IN SECTION UMC 771.11, IF-

(1) TIMELY AND COMPLETE APPLICATION FOR A PERMIT UNDER THE PERMANENT REGULATORY PROGRAM HAS BEEN MADE TO THE DIVISION IN ACCORDANCE WITH THE PROVISIONS OF THE ACT, THIS SUBCHAPTER, AND THE REGULATORY PROGRAM;

(2) THE DIVISION HAS NOT YET RENDERED AN INITIAL DECISION WITH RESPECT TO SUCH APPLICATION; AND

(3) THE ACTIVITIES ARE CONDUCTED IN COMPLIANCE WITH ALL TERMS AND CONDITIONS OF THE INTERIM PERMIT, THE REQUIREMENTS OF THE ACT, SUBCHAPTER B OF 30 CFR CHAPTER VII, AND STATE STATUTES AND REGULATIONS.

RESPONSE:

Mining has been conducted at the Plateau Mining Company (PMC) coal holdings since 1917. A permit application for the Star Point Mines was submitted in March, 1980, by UNC Plateau Mining Company as a followup to the initial mining permit issued July 22, 1977. The March, 1980, application was superseded and replaced in February, 1981. Formal approval was granted by The Office of Surface Mining (OSM) on January 21, 1982. The Utah Division of Oil, Gas and Mining (DOGM) formally granted approval January 27, 1982.

The activities conducted during the permitting processes were conducted in accordance with State statutes and regulations.

CHAPTER VII. DURING THIS PERIOD, NO NEW PERMITS FOR UNDERGROUND COAL MINING ACTIVITIES SHALL BE ISSUED BY THE STATE. PERMITS WHICH LAPSE DURING THIS PERIOD MAY CONTINUE IN FULL FORCE AND EFFECT WITHIN THE SPECIFIED PERMIT AREA, UNTIL PROMULGATION OF A FEDERAL PROGRAM FOR THE STATE. PERMITS WHICH LAPSE DURING THIS PERIOD MAY CONTINUE IN FULL FORCE AND EFFECT WITHIN THE SPECIFIED PERMIT AREA, UNTIL PROMULGATION OF A FEDERAL PROGRAM FOR THE STATE.

(B) A PERSON CONDUCTING UNDERGROUND COAL MINING ACTIVITIES, UNDER A PERMIT ISSUED OR AMENDED BY THE DIVISION IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 502 OF THE FEDERAL ACT, MAY CONDUCT THESE ACTIVITIES BEYOND THE PERIOD DESCRIBED IN SECTION UMC 771.11, IF-

(1) TIMELY AND COMPLETE APPLICATION FOR A PERMIT UNDER THE PERMANENT REGULATORY PROGRAM HAS BEEN MADE TO THE DIVISION IN ACCORDANCE WITH THE PROVISIONS OF THE ACT, THIS SUBCHAPTER, AND THE REGULATORY PROGRAM;

(2) THE DIVISION HAS NOT YET RENDERED AN INITIAL DECISION WITH RESPECT TO SUCH APPLICATION; AND

(3) THE ACTIVITIES ARE CONDUCTED IN COMPLIANCE WITH ALL TERMS AND CONDITIONS OF THE INTERIM PERMIT, THE REQUIREMENTS OF THE ACT, SUBCHAPTER B OF 30 CFR CHAPTER VII, AND STATE STATUTES AND REGULATIONS.

RESPONSE:

Mining has been conducted at the Plateau Mining Company (PMC) coal holdings since 1917. A permit application for the Star Point Mines was submitted in March, 1980, by UNC Plateau Mining Company as a followup to the initial mining permit issued July 22, 1977. The March, 1980, application was superseded and replaced in February, 1981. Formal approval was granted by The Office of Surface Mining (OSM) on January 21, 1982. The Utah Division of Oil, Gas and Mining (DOGM) formally granted approval January 27, 1982. PMC submitted a permit renewal application on September 29, 1986.

The activities conducted during the permitting processes were conducted in accordance with State statutes and regulations.

UMC 771.15 - CONTINUED OPERATION UNDER FEDERAL PROGRAM PERMITS

A PERMIT ISSUED BY THE REGIONAL DIRECTOR PURSUANT TO A FEDERAL PROGRAM FOR A STATE SHALL BE VALID UNDER THE SUPERCEDING STATE PROGRAM APPROVED BY THE SECRETARY.

(A) THE FEDERAL PERMITTEE SHALL HAVE THE RIGHT TO APPLY TO THE DIVISION FOR A STATE PERMIT TO SUPERSEDE THE FEDERAL PERMIT.

(B) THE DIVISION MAY REVIEW A PERMIT ISSUED PURSUANT TO THE SUPERSEDED FEDERAL PROGRAM, TO DETERMINE THAT THE REQUIREMENTS OF THE ACT OF THE APPROVED STATE PROGRAM ARE NOT VIOLATED BY THE FEDERAL PERMIT.

(C) TO THE EXTENT THAT THE APPROVED STATE PROGRAM CONTAINS ADDITIONAL REQUIREMENTS NOT CONTAINED IN THE FEDERAL PROGRAM FOR THE STATE, THE DIVISION SHALL-

(1) PROMPTLY ISSUE AN ORDER REQUIRING THE PERMITTEE TO COMPLY WITH SUCH ADDITIONAL REQUIREMENTS WITHIN 60 DAYS OF THE ISSUANCE OF THE ORDER, UNLESS THE PERMITTEE DEMONSTRATES TO THE DIVISION THAT IT IS PHYSICALLY IMPOSSIBLE TO MEET THOSE ADDITIONAL REQUIREMENTS WITHIN 60 DAYS, OR UNLESS THE DIVISION AGREES TO A LONGER PERIOD UNDER AN ESTABLISHED TIME SCHEDULE; AND

(2) NOTIFY THE PERMITTEE, IN WRITING, OF THE RIGHT TO A HEARING WITH RESPECT TO THE ORDER, IN THE MANNER AND TIME PROVIDED FOR IN THE STATE PROGRAM.

RESPONSE:

PMC will continue to operate the Star Point Mines as approved by DOGM under Permit ACT/007/006. The DOGM regulatory program has been approved by OSM.

UMC 771.19 COMPLIANCE WITH PERMITS

ALL PERSONS SHALL CONDUCT SURFACE COAL MINING AND RECLAMATION ACTIVITIES UNDER PERMITS ISSUED PURSUANT TO THIS SUBCHAPTER AND REGULATORY PROGRAM AND SHALL COMPLY WITH THE TERMS AND CONDITIONS OF THE PERMIT AND THE REQUIREMENTS OF THE ACT, THIS CHAPTER, AND THE REGULATORY PROGRAM.

RESPONSE:
PMC will comply with the terms and conditions of the permit and the requirements of the act, this chapter, and the regulatory program.

UMC 771.21 PERMIT APPLICATION FILING DEADLINES

(A) INTITIAL IMPLEMENTATION OF PERMANENT REGULATORY PROGRAMS.

(1) NOT LATER THAN 2 MONTHS FOLLOWING THE INITIAL APPROVAL BY THE SECRETARY OF REGULATORY PROGRAM UNDER 30 CFR 730 REGARDLESS OF LITIGATION CONTESTING THAT APPROVAL, EACH PERSON WHO CONDUCTS OR EXPECTS TO CONDUCT UNDERGROUND COAL MINING ACTIVITIES AFTER THE EXPIRATION OF 8 MONTHS FROM THAT APPROVAL SHALL FILE AN APPLICATION FOR A PERMIT FOR THOSE ACTIVITIES.

(2) APPLICATIONS FOR THOSE ACTIVITIES WHICH ARE NOT FILED WITHIN THE TIME REQUIRED BY PARAGRAPH (A)(1) OF THIS SECTION SHALL BE DEEMED APPLICATIONS FILED UNDER PARAGRAPH (B)(1) OF THIS SECTION.

(B) FILING DEADLINES AFTER INITIAL IMPLEMENTATION OF PERMANENT REGULATORY PROGRAM.

(1) GENERAL. EACH PERSON WHO CONDUCTS OR EXPECTS TO CONDUCT NEW UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES SHALL FILE A COMPLETE APPLICATION FOR A PERMIT THREE MONTHS PRIOR TO THE EXPECTED START DATE.

(2) RENEWAL OF VALID PERMITS. AN APPLICATION FOR RENEWAL OF A PERMIT SHALL BE FILED WITH THE DIVISION AT LEAST 120 DAYS BEFORE THE EXPIRATION OF THE PERMIT INVOLVED.

(3) REVISIONS OF PERMITS. ANY APPLICATION FOR REVISION OF A PERMIT SHALL BE FILED WITH THE DIVISION 60 DAYS BEFORE THE DATE ON WHICH THE PERMITTEE EXPECTS TO REVISE UNDERGROUND COAL MINING ACTIVITIES.

(4) SUCCESSION TO RIGHTS GRANTED UNDER PRIOR PERMITS. ANY APPLICATION FOR A NEW PERMIT REQUIRED FOR A PERSON SUCCEEDING BY TRANSFER, SALE, OR ASSIGNMENT OF RIGHTS GRANTED UNDER A PERMIT SHALL BE FILED WITH THE DIVISION NOT LATER THAN 30 DAYS AFTER THAT SUCCESSION IS APPROVED BY THE DIVISION.

RESPONSE:
This application for permit is submitted no less than 90 days prior to expected activity in the new areas.

Notification of PMC's change of ownership was filed with DOGM on April 15, 1986.

UMC 771.23 PERMIT APPLICATIONS - GENERAL REQUIREMENTS FOR FORMAT AND CONTENTS

(A) APPLICATIONS FOR PERMITS TO CONDUCT UNDERGROUND COAL MINING ACTIVITIES SHALL MEET THE APPLICATION REQUIREMENTS OF SECTION 40-10-10 OF THE ACT AND SHALL BE SUBMITTED ON DIVISION FORM UMC-1. THE APPLICATION SHALL BE COMPLETE AND INCLUDE, AT A MINIMUM, ALL THE APPLICABLE INFORMATION REQUIRED UNDER UMC 782, 783, AND 784, AND, FOR SPECIAL TYPES OF UNDERGROUND COAL MINING ACTIVITIES, THE INFORMATION REQUIRED UNDER UMC 785.

RESPONSE:
The permit application includes a submittal letter with original signature. This letter has been placed in the front of the application immediately before the Table of Contents. This permit application is formatted to insure the information required under UMC 782, 783, and 784 is included in the response. Since this is a permit renewal application, responses to section 788 have also been included. The format is devised

to state the regulation with the response directly following. This format should speed the review process and confirm completeness.

(B) INFORMATION SET FORTH IN THE APPLICATION SHALL BE CURRENT, PRESENTED CLEARLY AND CONCISELY, AND SUPPORTED BY APPROPRIATE REFERENCES TO TECHNICAL AND OTHER WRITTEN MATERIAL AVAILABLE TO THE DIVISION.

RESPONSE:

The information contained in this permit application is taken from our current permit with updated material where warranted. PMC has endeavored to delineate information in this application as clearly and concisely as possible, consistent with the scope of the regulations. Special care has been taken to support all information by technical references and other appropriate authorities. A bibliography is included with this application as Exhibit 1, Bibliography. Special attention has been given during the development of this application to document all conclusions with sound technical data.

(C) ALL TECHNICAL DATA SUBMITTED IN THE APPLICATION SHALL BE ACCOMPANIED BY-

(1) NAMES OF PERSONS OR ORGANIZATIONS WHICH COLLECTED AND ANALYZED SUCH DATA;

(2) DATES OF THE COLLECTION AND ANALYSES; AND

(3) DESCRIPTIONS OF METHODOLOGY USED TO COLLECT AND ANALYZE THE DATA.

RESPONSE:

The following are the technical and professional personnel and organizations who collected, analyzed, and/or assisted in the development of the information contained in this permit application.

Plateau Mining Company

Ben Grimes	Sr. Environmental Engineer
Greg Hunt	Geologist
Tom Hurst	Project Engineer
John J. Spiecha	Vice President & General Manager
Bob Lauman	Manager of Technical Services
Steve Jones	Project Engineer
John Rosner	Project Engineer

Cyprus Minerals Company

George Trabits	Director of Environmental Services
Phillip Wolf	Attorney
Jerry Bateman	Land Person

All technical data in this application has been analyzed under the requirements of the Rules. Much of the technical analyses have been done in accordance with the environmental guidelines issued by the State of Utah.

PMC personnel have met with the DOGM during the last several months to discuss pertinent aspects of mining and reclamation plans. Most of the technical work in this application has proceeded or was generated in accordance with determinations and conversations with the agency. As questions concerning various parts of the rules emerged, PMC immediately contacted the DOGM for direction and guidance concerning the methodologies to be followed.

(D) THE APPLICATION SHALL STATE THE NAME, ADDRESS AND POSITION OF OFFICIALS OF EACH PRIVATE OR ACADEMIC RESEARCH ORGANIZATION OR GOVERNMENTAL AGENCY CONSULTED BY THE APPLICANT IN PREPARATION OF THE APPLICATION FOR INFORMATION ON LAND USES, SOILS, GEOLOGY, VEGETATION, FISH AND WILDLIFE, WATER QUANTITY AND QUALITY, AIR QUALITY, AND ARCHEOLOGICAL, CULTURAL, AND HISTORICAL FEATURES.

RESPONSE:

The following are the names, addresses, and positions of officials of each private or academic research organization or governmental agency consulted by the applicant in preparation of this permit renewal application for information on land uses, soils, geology, vegetation, fish and wildlife, water quantity and quality, air quality, and archaeological, cultural, and historic features:

Land Uses

U.S.D.A. Manti-La Sal National Forest
599 West Price River Drive
Price, Utah 84501

U.S.D.I. Bureau of Land Management
900 North 700 East
Price, Utah 84501

Carbon County
County Courthouse
Price, Utah 84501

Soils

Scott Lowe
Plateau Mining Company
(former summer graduate level soils scientist)

Alvin Southard
Professor of Soil Science
Utah State University

Melvin A. Coonrod
former Environmental Coordinator
Plateau Mining Company
P.O. Drawer PMC
Price, UT 84501

RESPONSE:

The following are the names, addresses, and positions of officials of each private or academic research organization or governmental agency consulted by the applicant in preparation of this permit application for information on land uses, soils, geology, vegetation, fish and wildlife, water quantity and quality, air quality, and archaeological, cultural, and historic features:

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U.S.D.I. Bureau of Land Management
900 North 700 East
Price, Utah 84501

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County Courthouse
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Scott Lowe
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Professor of Soil Science
Utah State University

Melvin A. Coonrod
former Environmental Coordinator
Plateau Mining Company
P.O. Drawer PMC
Price, UT 84501

Stanley L. Welsh
Joseph R. Murdock
Leah Jeuarrys
Endangered Plant Studies, Inc.
129 North 1000 East
Orem, UT 84057

Susan White
Don Wagenet
Native Plants Inc.
360 Wakara Way
University Research Park
Salt Lake City, UT 84108

John L. Swenson
Wesley L. Koetch
Laurel Stott
Mesa Corporation
Suite 2003
Salt Lake City, UT 84111

George S. Cook
Brock Benson
Gary D. Moreau
Don Andrews
E. Jensen
USDA - Soil Conservation Service
Price, UT 84501

Ruel E. Lamborn
Utah State University
Soils Laboratory
Logan, UT 84322

Ralph V. Poulsen
Bookcliffs Commercial Laboratories
1475 Pine Grove Road
P.O. Box 774018
Steamboat Springs, CO 80477

Ford Chemical Laboratory, Inc.
40 West Louise Ave.
Salt Lake City, UT 84115

Commercial Testing & Engineering Co.
139 South Main
Helpher, UT 84526

Vaughn Hansen Associates
Waterbury Plaza, Suite A
5620 South 1475 East
Salt Lake City, UT 84121

Cyrus M. McKell
Gordon A. Van Epps
Institute for Land Rehabilitation
UMC 52
Utah State University
Logan, UT 84322

Mark L. Adkins
Ben Grimes
Plateau Mining Company
P.O. Drawer PMC
Price, UT 84501

Clem R. Parkin
Kent A. Crofts
David B. McMindes
all formerly with
Getty Mining Company
23385 Routt County Road #33
Oak Creek, CO 80467

Kent A. Crofts
IME
P.O. Box 270
Yampa, CO 80483

Dan Larsen
Soils Scientist
Manti-La Sal National Forest
Forest Supervisors Office
Price, UT 84501

Vegetation

George S. Cook
Brock Benson
Gary D. Moreau
Don Andrews
USDA - Soil Conservation Service
Price, UT 84501

Stanley L. Welsh
Joseph R. Murdock
Endangered Plant Studies, Inc.
129 North 1000 East
Orem, UT 84057

Melvin Coonrod
former Environmental Coordinator
Plateau Mining Company
P.O. Drawer PMC
Price, UT 84501

David B. McMindes
Clem R. Parkin
Kent A. Crofts
Larry Germain
Kent Carlson
Sue Kelso
Claire Semmer
Carol Sulitieanu-Taylor
Tod Zechiel
Steve Price
Connie Roberts
Brenda Becker
all formerly of
Getty Mining Company
23385 Routt County Road #33
Oak Creek, CO 80467

Mark L. Adkins
Ben Grimes
Plateau Mining Company
P.O. Drawer PMC
Price, UT 84501

Kent A. Crofts
IME
P.O. Box 270
Yampa, CO 80483

Fish and Wildlife

Robert N. Winget, Ph.D.
Environmental Consultants
483 East 1834 South
Orem, Utah 84057

Clyde Pritchett, Ph.D.
Department of Zoology
Brigham Young University
Provo, Utah 84602

Gar Workman, Ph.D.
Associate Professor
Department of Wildlife Science
Utah State University UMC52
Logan, Utah 84322

Larry Dalton - Resource Analyst
Miles Moretti - Non-Game Biologist
Utah Division of Wildlife Resources
Southeastern Regional Office
455 West Railroad Avenue, Box 840
Price, Utah 84501

Clark Johnson
U.S.D.I. Fish and Wildlife Service
1745 West 1700 South
Salt Lake City, Utah

Water Quantity and Quality

Vaughn Hansen, Ph.D.
Marvin Allen
David Hansen
Jerry Hansen
Paul Hansen

Greg Poole
Mike Wheelwright
Vaughn Hansen Associates
Waterbury Plaza - Suite A
5620 South 1475 East
Salt Lake City, Utah 84121

Utah State Health Department
Bureau of Water Pollution Control
4231 State Office Building
Salt Lake City, Utah

Utah State Engineer
Division of Water Rights
1636 West North Temple
Salt Lake City, Utah 84116

Mark Page
Utah State Engineer
Division of Water Rights
453 South Carbon Avenue
Price, Utah 84501

Air Quality
Brent Bradford
Utah State Department
Bureau of Air Quality
P.O. Box 16690
Salt Lake City, Utah 84116-0690

Archeological, Cultural, and Historic Features
Melvin Smith
Division of State History
300 Rio Grande St.
Salt Lake City, Utah 84101

F.R. Hauck, Ph.D.
Archaeological Environmental Research Corp.
1433 East Maple Hills Drive
Bountiful, Utah

Lloyd M. Pierson
K.K. Pelli
Cultural Resource Management Specialists
Box 621
Moab, Utah 84532

Paul R. Nickens, Ph.D.
Diana Christensen
Nickens and Associates
P.O. Box 727
Montrose, Colorado 81402

Steven R. Simms
P/S Scientific, Inc.
307 West 200 South
Salt Lake City, Utah 84101

Geotechnical

Ralph Rollins, Ph.D.
Rollins Brown and Gunnell, Inc.
Professional Engineers
1435 West 820 North
P.O. Box 711
Provo, Utah 84603

James Nordquist, Inc.
Chen and Associates
401 Ironwood Drive
Salt Lake City, Utah 84115

Hamid Maleki
J.F.T. Agapito & Associates, Inc.
Consulting Geotechnical and Mining Engineers
715 Horizon Drive, Suite 340
Grand Junction, Colorado 81506

Permit Review and Preparation

Jerry Koblitz
Greystone Development Consultants, Inc.
7308 South Alton Way, Suite K
Englewood, Colorado 80112

(E) MAPS AND PLANS - GENERAL REQUIREMENTS.

(1) MAPS SUBMITTED WITH APPLICATIONS SHALL BE PRESENTED IN A CONSOLIDATED FORMAT, TO THE EXTENT POSSIBLE, AND SHALL INCLUDE ALL THE TYPES OF INFORMATION THAT ARE SET FORTH ON TOPOGRAPHIC MAPS OF THE U.S. GEOLOGICAL SURVEY OF THE 1:24,000 SCALE SERIES. MAPS OF THE PERMIT AREA SHALL BE AT A SCALE OF 1:6,000 OR LARGER. MAPS OF THE REMAINDER OF THE MINE PLAN AREA AND THE ADJACENT AREAS SHALL CLEARLY SHOW THE LANDS AND WATERS WITHIN THOSE AREAS AND BE IN A SCALE DETERMINED BY THE DIVISION, BUT IN NO EVENT SMALLER THAN 1:24,000.

(2) ALL MAPS AND PLANS SUBMITTED WITH THE APPLICATION SHALL DISTINGUISH AMONG EACH OF THE PHASES DURING WHICH UNDERGROUND COAL MINING ACTIVITIES WERE OR WILL BE CONDUCTED AT ANY PLACE WITHIN THE MINE PLAN AREA. AT A MINIMUM, DISTINCTIONS SHALL BE CLEARLY SHOWN AMONG THOSE PORTIONS OF THE MINE PLAN AREA IN WHICH UNDERGROUND COAL MINING ACTIVITIES OCCURRED-

(I) PRIOR TO AUGUST 3, 1977;

(II) AFTER AUGUST 3, 1977, AND PRIOR TO EITHER-

(A) MAY 3, 1978; OR

(B) IN THE CASE OF AN APPLICANT OR OPERATOR WHICH OBTAINED A SMALL OPERATOR'S EXEMPTION IN ACCORDANCE WITH 30 CFR 710.12, JANUARY 1, 1979;

(III) AFTER MAY 3, 1978 (OR JANUARY 1, 1979, FOR PERSONS WHO RECEIVED A SMALL OPERATOR'S EXEMPTION) AND PRIOR TO THE APPROVAL OF THE REGULATORY PROGRAM;

(IV) AFTER THE ESTIMATED DATE OF ISSUANCE OF A PERMIT BY THE DIVISION.

RESPONSE:

Maps which are intended to cover areas of large areal extent will generally be at a scale of 1:12,000 (1" = 1000 ft.) and will include the information generally available on U.S. Geological Survey (USGS) maps. Maps of smaller areas will be at an appropriate scale to provide sufficient detail for review. The permit area can be seen on Map 71, Permit Area Map. Map 1, Pre-Law Mining Activities, Hiawatha Seam, Third Seam and Wattis Seam, delineates the areas mined prior to August 3, 1977.

UMC 771.25 PERMIT FEES

EACH APPLICATION FOR AN UNDERGROUND COAL MINING ACTIVITIES PERMIT PURSUANT TO THE REGULATORY PROGRAM SHALL BE ACCOMPANIED BY A FEE OF $5.00.

RESPONSE:

This permit application is accompanied by the fee requested, $5.00.

UMC 771.27 VERIFICATION OF APPLICATION

APPLICATIONS FOR PERMITS SHALL BE VERIFIED UNDER OATH, BY A RESPONSIBLE

(B) IN THE CASE OF AN APPLICANT OR OPERATOR WHICH OBTAINED A SMALL OPERATOR'S EXEMPTION IN ACCORDANCE WITH 30 CFR 710.12, JANUARY 1, 1979;

(III) AFTER MAY 3, 1978 (OR JANUARY 1, 1979, FOR PERSONS WHO RECEIVED A SMALL OPERATOR'S EXEMPTION) AND PRIOR TO THE APPROVAL OF THE REGULATORY PROGRAM;

(IV) AFTER THE ESTIMATED DATE OF ISSUANCE OF A PERMIT BY THE DIVISION.

RESPONSE:
Maps which are intended to cover areas of large areal extent will generally be at a scale of 1:12,000 (1" = 1000 ft.) and will include the information generally available on U.S. Geological Survey (USGS) maps. Maps of smaller areas will be at an appropriate scale to provide sufficient detail for review. The permit area can be seen on Maps 2, 3, 4, 5 or 6. Map 1, Pre-Law Mining Activities, Hiawatha Seam, Third Seam and Wattis Seam, delineates the areas mined prior to August 3, 1977.

UMC 771.25 PERMIT FEES

EACH APPLICATION FOR AN UNDERGROUND COAL MINING ACTIVITIES PERMIT PURSUANT TO THE REGULATORY PROGRAM SHALL BE ACCOMPANIED BY A FEE OF $5.00.

RESPONSE:
This permit renewal application is accompanied by the fee requested, $5.00.

UMC 771.27 VERIFICATION OF APPLICATION

APPLICATIONS FOR PERMITS SHALL BE VERIFIED UNDER OATH, BY A RESPONSIBLE

OFFICIAL OF THE APPLICANT, THAT THE INFORMATION CONTAINED IN THE APPLICATION IS TRUE AND CORRECT TO THE BEST OF THE OFFICIAL'S INFORMATION AND BELIEF.

RESPONSE:

The certification that the information contained in this application is true and correct to the best of current knowledge, information, and belief is set forth in the cover letter provided with the appropriate signatures.

PART UMC 782 - UNDERGROUND COAL MINING PERMIT APPLICATIONS - REQUIREMENTS FOR LEGAL, FINANCIAL, COMPLIANCE, AND RELATED INFORMATION

UMC 782.2 OBJECTIVES

THE OBJECTIVE OF THIS PART IS TO ENSURE THAT ALL RELEVANT INFORMATION ON THE OWNERSHIP AND CONTROL OF PERSONS WHO CONDUCT UNDERGROUND COAL MINING ACTIVITIES, THE OWNERSHIP AND CONTROL OF THE PROPERTY TO BE AFFECTED BY THE ACTIVITIES, THE COMPLIANCE STATUS AND HISTORY OF THOSE PERSONS, AND OTHER IMPORTANT INFORMATION IS PROVIDED IN THE APPLICATION TO THE DIVISION.

UMC 782.4 RESPONSIBILITY

IT IS THE RESPONSIBILITY OF THE PERMIT APPLICANT TO PROVIDE TO THE DIVISION ALL OF THE INFORMATION REQUIRED BY THIS PART.

UMC 782.11 APPLICABILITY

THIS PART APPLIES TO ANY PERSON WHO APPLIES FOR A PERMIT TO CONDUCT UNDERGROUND COAL MINING ACTIVITIES.

UMC 782.13 IDENTIFICATION OF INTERESTS

(a) EACH APPLICATION SHALL CONTAIN THE NAMES AND ADDRESSES OF -

(1) THE PERMIT APPLICANT, INCLUDING HIS OR HER TELEPHONE NUMBER;

RESPONSE:

General Office
Plateau Mining Company
7200 South Alton Way
P. O. Box 3299
Englewood, CO 80155
(303) 740-5100

Local Office
Plateau Mining Company
P. O. Drawer PMC
Price, UT 84501
(801) 637-2875

(2) EVERY LEGAL OR EQUITABLE OWNER OF RECORD OF THE AREAS TO BE AFFECTED BY SURFACE OPERATIONS AND FACILITIES AND EVERY LEGAL OR EQUITABLE OWNER OF RECORD OF THE COAL TO BE MINED;

RESPONSE:

Every legal or equitable owner of record of areas to be affected by surface operations and facilities is as follows:

Surface Ownership

Cyprus Western Coal Company
7200 South Alton Way
Englewood, CO 80112

United States Government
Bureau of Land Management
Price, UT 84501

United States Government
Manti-La Sal Forest
Price, UT 84501

State of Utah
Division of State Lands
105 State Capitol Building
Salt Lake City, UT 84114

Coal Ownership

Cyprus Western Coal Company
7200 South Alton Way
Englewood, CO 80112

United States Government
State of Utah

(3) THE HOLDERS OF RECORD OF ANY LEASEHOLD INTEREST IN AREAS TO BE AFFECTED BY SURFACE OPERATIONS OR FACILITIES AND THE HOLDERS OF RECORD OF ANY LEASEHOLD INTEREST IN THE COAL TO BE MINED;

RESPONSE:

The major lessee of interest in the surface areas to be affected by surface operations or facilities is Cyprus Western as shown on Map 2, Surface Ownership. The only holder of any leasehold interest in the coal to be mined is Cyprus Western Coal Company (Cyprus Western). Coal in two parcels within the present permit area is controlled by other owners as shown on Map 3, Coal Ownership and Cultural Resource Survey Areas. No mineable coal exists in either parcel.

(4) ANY PURCHASER OF RECORD UNDER A REAL ESTATE CONTRACT OF AREAS TO BE AFFECTED BY SURFACE OPERATIONS AND FACILITIES AND ANY PURCHASER OF RECORD UNDER A REAL ESTATE CONTRACT OF THE COAL TO BE MINED;

RESPONSE:

There are no known purchasers of record under real estate contract of surface or coal interests for property to be mined or the surface areas to be affected.

(5) THE OPERATOR, IF THE OPERATOR IS A PERSON DIFFERENT FROM THE APPLICANT, INCLUDING HIS OR HER TELEPHONE NUMBER; AND

RESPONSE:

PMC is the applicant for the permit. PMC may, from time to time, subcontract various portions of the operating work to other entities.

(6) THE RESIDENT AGENT OF THE APPLICANT WHO WILL ACCEPT SERVICE OF PROCESS, INCLUDING HIS OR HER TELEPHONE NUMBER.

RESPONSE:

The address of the resident agent of PMC who will accept service of process, including the telephone number, is as follows:

D. Blair
C. T. Corp.
170 South Main
Salt Lake City, UT 84101
(801) 521-3200

(b) EACH APPLICATION SHALL CONTAIN A STATEMENT OF WHETHER THE APPLICANT IS A CORPORATION, PARTNERSHIP, SINGLE PROPRIETORSHIP, ASSOCIATION, OR OTHER BUSINESS ENTITY. FOR BUSINESSES OTHER THAN SINGLE PROPRIETORSHIPS, THE APPLICATION SHALL CONTAIN THE FOLLOWING INFORMATION; WHERE APPLICABLE:

RESPONSE:

The applicant mine operator, PMC, is a Delaware corporation duly authorized to do business in the State of Utah. PMC is a wholly-owned subsidiary of Cyprus Western Coal Equipment Company. Cyprus Western Coal Equipment Company is a wholly owned subsidiary of Cyprus Western Coal Company, which is a wholly owned subsidiary of Cyprus Coal Company.

(1) NAMES AND ADDRESSES OF EVERY OFFICER, PARTNER, DIRECTOR, OR OTHER PERSON PERFORMING A FUNCTION SIMILAR TO A DIRECTOR OF THE APPLICANT;

RESPONSE:

The names and addresses of the officers and directors of PMC are as follows: (Note: Unless specifically listed as otherwise, the address of officers and directors is:

7200 South Alton Way
P. O. Box 3299
Englewood, CO 80155

President	D. P. Bellum
Executive Vice President	C. B. Stone, Jr.
Vice President	D. P. Brown
Vice President	S. R. Snow
Vice President	L. R. Graber
Vice President	M. S. Harrington
Vice President	J.J. Spiecha P. O. Drawer PMC Price, UT 84501
Secretary	P. C. Wolf
Vice President & Controller	R. D. Mills
Vice President & Treasurer	D. C. Haugh
Asst. Secretary	D. J. Friedman
Asst. Secretary	D. E. Huffman
Asst. Secretary	K. Loughrey
Asst. Treasurer	J. G. Hall
Asst. Controller-Tax	J. D. Flemming
Director	D. P. Bellum
Director	C. B. Stone, Jr.
Director	P. C. Wolf

(1) NAMES AND ADDRESSES OF EVERY OFFICER, PARTNER, DIRECTOR, OR OTHER PERSON PERFORMING A FUNCTION SIMILAR TO A DIRECTOR OF THE APPLICANT;

RESPONSE:

The names and addresses of the officers and directors of PMC are as follows: (Note: Unless specifically listed as otherwise, the address of officers and directors is:

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P. O. Box 3299
Englewood, CO 80155

President	D. P. Bellum
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Vice President	D. P. Brown
Vice President	S. R. Snow
Vice President	L. R. Graber
Vice President	M. S. Harrington
Vice President	J. J. Spiecha

P. O. Drawer PMC
Price, UT 84501

Secretary	P. C. Wolf
Vice President & Controller	R. D. Mills
Vice President & Treasurer	D. C. Haugh
Asst. Secretary	D. J. Friedman
Asst. Secretary	D. E. Huffman
Asst. Secretary	K. Loughrey
Asst. Treasurer	J. G. Hall
Asst. Controller-Tax	J. D. Flemming
Director	D. P. Bellum
Director	C. B. Stone, Jr.
Director	P. C. Wolf

(2) NAME AND ADDRESS OF ANY PERSON WHO IS A PRINCIPAL SHAREHOLDER OF THE APPLICANT; AND

RESPONSE:

The name and address of the principal shareholder of PMC is as follows:

Cyprus Western Coal Equipment Company
7200 South Alton Way
P. O. Box 3299
Englewood, CO 80155

(3) NAMES UNDER WHICH THE APPLICANT, PARTNER, OR PRINCIPAL SHAREHOLDER PREVIOUSLY OPERATED UNDERGROUND OR SURFACE COAL MINING ACTIVITIES IN THE UNITED STATES WITHIN THE 5 YEARS PRECEDING THE DATE OF APPLICATION.

RESPONSE:

Applicant

The applicant's predecessor operated the Star Point Mines (for which this application is submitted) from its date of incorporation, October 21, 1971, until April 2, 1979, under the name Plateau Mining Company.

From April 2, 1979, until July 23, 1980, the applicant's predecessor operated the Star Point Mines under the name UNC Plateau Mining Company, after which time the name was changed to Plateau Mining Company. On August 26, 1982, a new company was formed to operate the subject mine bearing the name Plateau Mining Company. The company's predecessor changed its name from Plateau Mining Company to Plateau Company.

Principal Shareholder

The only shareholder of PMC is Cyprus Western Coal Equipment Company, a wholly-owned subsidiary of Cyprus Western Coal Company. Cyprus Western Coal Company also operates coal mines at various locations in the United States. The names, permit numbers, and general locations of these operations are as follows:

Colorado Yampa Coal Company Permit No. C-071-81	Colorado
Twentymile Coal Company Permit No. C-056-85	Colorado

(c) IF ANY OWNER, HOLDER, PURCHASER, OR OPERATOR, IDENTIFIED UNDER PARAGRAPH (a) OF THIS SECTION, IS A BUSINESS ENTITY OTHER THAN A SINGLE PROPRIETOR, THE APPLICATION SHALL CONTAIN THE NAMES AND ADDRESS OF THEIR RESPECTIVE PRINCIPALS, OFFICERS AND RESIDENT AGENTS.

RESPONSE:

The only owner, holder, purchaser, or operator identified under Section UMC 782.13(a) who is a business entity other than PMC is Cyprus Western Coal Equipment Company, whose principals, officers, and resident agent are as follows:

Business Offices	7200 South Alton Way P. O. Box 3299 Englewood, CO 80155

Officers:

President	D. P. Bellum
Executive Vice President	C. B. Stone, Jr.
Vice President	D.P. Brown
Vice President	L. R. Graber
Vice President	M. S. Harrington
Vice President	B. C. Minich
Vice President	S. R. Snow
Vice President & Treasurer	D. C. Haugh
Vice President & Controller	R. D. Mills
Vice President	G. E. Vajda
Secretary	P. C. Wolf
Assistant Treasurer	J. G. Hall
Assistant Controller-Tax	J. D. Flemming
Assistant Secretary	D. J. Friedman
Assistant Secretary	D. E. Huffman
Assistant Secretary	K. Loughrey

Directors:

D. P. Bellum

C. B. Stone, Jr.

P. C. Wolf

Resident Agent:

D. Blair

C. T. Corp.

170 South Main

Salt Lake City, UT 84101

Officers:

President	D. P. Bellum
Executive Vice President	C. B. Stone, Jr.
Vice President	D.P. Brown
Vice President	L. R. Graber
Vice President	M. S. Harrington
Vice President	B. C. Minich
Vice President	S. R. Snow
Vice President & Treasurer	D. C. Haugh
Vice President & Controller	R.D. Mills
Vice President	G. E. Vajda
Secretary	P. C. Wolf
Assistant Treasurer	J. G. Hall
Assistant Controller-Tax	J. D. Flemming
Assistant Secretary	D. J. Friedman
Assistant Secretary	D. E. Huffman
Assistant Secretary	K. Loughrey

Directors:

D. P. Bellum

C. B. Stone, Jr.

P. C. Wolf

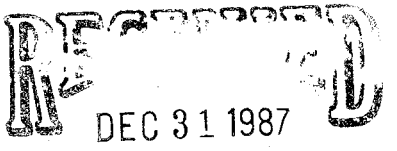
Resident Agent:

D. Blair

C. T. Corp.

170 South Main

Salt Lake City, UT 84101



DIVISION OF
OIL, GAS & MINING

Revised 12/15/86

(d) EACH APPLICATION SHALL CONTAIN A STATEMENT OF ANY CURRENT OR PREVIOUS COAL MINING PERMITS IN THE UNITED STATES HELD BY THE APPLICANT SUBSEQUENT TO 1970 AND BY ANY PERSON IDENTIFIED IN PARAGRAPH (B)(3) OF THIS SECTION AND OF ANY PENDING PERMIT APPLICATION TO CONDUCT UNDERGROUND OR SURFACE COAL MINING ACTIVITIES IN THE UNITED STATES. THE INFORMATION SHALL BE LISTED BY PERMIT OR APPLICATION NUMBER AND IDENTIFY THE DIVISION FOR EACH OF THOSE COAL MINING OPERATIONS.

RESPONSE:

Although the direct response to Rule 782.13(d) technically does not include any entity other than PMC, wholly-owned subsidiaries of Cyprus Western Coal Equipment Company do hold permits in the U.S.

Application

The applicant, Plateau Mining Company, holds Permit ACT/007/006 for its Star Point Mines mining operation in Carbon County, UT. The permit was approved and issued by the Utah Division of Oil, Gas and Mining (DOGM) on January 27, 1982.

Principal Shareholder

Cyprus Western Coal Equipment Company, the principal shareholder of PMC, holds permits to mine coal under affiliated companies in the United States. The list of affiliates and their associated permits follow:

Colorado Yampa Coal Company

- 1969 Colorado Open Mining Land Reclamation Act - Permit No. 1, 13, 23, and 24.
- 1973 Colorado Open Mining Land Reclamation Act - Permit No. 43, 44, 46, 55, and 56.

- 1976 Colorado Mined Land Reclamation Act - Permit No. 76-16. Note: Permit 76-16 consolidates all previous permits together with certain additional acreage into a single life of the mine permit.
- Permit No. C-071-81, Department of Interior, Office of Surface Mining.
- Permit No. C-071-81, State Program Submission, Colorado Mined Land Reclamation Division.

Twentymile Coal Company

- Permit application C-036-81, Fish Creek Tipple and Haulroad
- Permit application C-056-85, Foidel Creek Mine.

(e) EACH APPLICATION SHALL CONTAIN THE NAMES AND ADDRESSEES OF THE OWNERS OF RECORD OF ALL SURFACE AND SUBSURFACE AREAS CONTIGUOUS TO ANY PART OF THE PROPOSED PERMIT AREA.

RESPONSE:

The owners of record of surface areas contiguous to the proposed permit area are shown on Map 2, Surface Ownership, and are listed below:

State of Utah
Division of State Lands
105 State Capital Building
Salt Lake City, UT 84114

Cyprus Western Coal Company
7200 South Alton Way
Englewood, CO 80112

United States Government
Bureau of Land Management
Price, UT 84501

Larry K. and Kelly P. Burnside
30 West First North Street
Huntington, UT 84528

United States Government
Manti-La Sal Forest
Price, UT 84501

Merrill and Freda L. Fillmore
Cleveland, UT

Clifford and Hazel Smith
Route #1
Price, UT 84501

Carbon County
Carbon County Courthouse
Price, UT 84501

U. S. Fuel Company
P. O. Box A
Hiawatha, UT 84527

Business Address:
U. S. Fuel Company
136 East South Temple
Salt Lake City, UT 84111

Owners of record of subsurface areas contiguous to the permit area are shown on Map 3, Coal Ownership and Cultural Resource Survey Areas, and are listed below.

State of Utah
Division of State Lands
105 State Capitol Building
Salt Lake City, UT 84114

Cyprus Western Coal Company
7200 South Alton Way
Englewood, CO 80112

United States Government
Bureau of Land Management
Price, UT 84501

U. S. Fuel Company
P. O. Box A
Hiawatha, UT 84527

Business Office
U. S. Fuel Company
136 East South Temple
Salt Lake City, UT 84111

(f) EACH APPLICATION SHALL CONTAIN THE NAME OF THE PROPOSED MINE AND THE MINE SAFETY AND HEALTH ADMINISTRATION IDENTIFICATION NUMBER FOR THE MINE AND ALL SECTIONS, IF ANY.

RESPONSE:

The name of the mining operation for which this application is submitted is:

STAR POINT MINES

The Mine Safety and Health Administration (MSHA) identification numbers are:

ID# - 42-00170	No. 1 Mine & surface operations	(6 sealed portals-being reclaimed)
ID# - 42-00171	No. 2 Mine	(12 portals)

(g) EACH APPLICATION SHALL CONTAIN A STATEMENT OF ALL LANDS, INTERESTS IN LANDS, OPTIONS, OR PENDING BIDS ON INTERESTS HELD OR MADE BY THE APPLICANT FOR LANDS WHICH ARE CONTIGUOUS TO THE AREA TO BE COVERED BY THE PERMIT.

RESPONSE:

Maps 2, Surface Ownership, and 3, Coal Ownership and Cultural Resource Survey Areas, show ownership interest in lands contiguous to the permit area. The applicant has no leasehold interest, options, or pending bids on any of these parcels.

The existing permit renewal application covers all land areas currently permitted by PMC or Cyprus Western Coal Company, but not limited as to any future by-pass acquisitions, lease modifications, or areas designated in expressions of interest, or areas under investigation that are contiguous to the operation's present permit boundaries.

Representative of the areas in which applicant has expressed an interest are the Castle Valley Ridge tract to the northwest of the permit area and the Tie Fork Tract to the southwest of the permit area (Figure 2, Areas of Interest).

UMC 782.14 COMPLIANCE INFORMATION

EACH APPLICATION SHALL CONTAIN-

(a) A STATEMENT OF WHETHER THE APPLICANT, ANY SUBSIDIARY, AFFILIATE, OR PERSONS CONTROLLED BY OR UNDER COMMON CONTROL WITH THE APPLICANT HAS:

(1) HAD A FEDERAL OR STATE MINING PERMIT SUSPENDED OR REVOKED IN THE LAST 5 YEARS; OR,

(2) FORFEITED A MINING BOND SIMILAR OR SECURITY DEPOSITED IN LIEU OF BOND.

RESPONSE:

No Federal or State mining permit held by the applicant or any subsidiary, affiliate, or persons controlled by or under common control with the applicant has been suspended or revoked, nor has any bond or similar security deposited in lieu of bond been forfeited.

RESPONSE:

Maps 2, Surface Ownership, and 3, Coal Ownership and Cultural Resource Survey Areas, show ownership interest in lands contiguous to the permit area. The applicant has no leasehold interest, options, or pending bids on any of these parcels.

The existing permit renewal application covers all land areas currently permitted by PMC or Cyprus Western Coal Company, but not limited as to any future by-pass acquisitions, lease modifications, or areas designated in expressions of interest, or areas under investigation that are contiguous to the operation's present permit boundaries.

Representative of the areas in which applicant has expressed an interest are the Castle Valley Ridge tract to the northwest of the permit area and the Tie Fork Tract to the southwest of the permit area (Figure 2, Areas of Interest).

UMC 782.14 COMPLIANCE INFORMATION

EACH APPLICATION SHALL CONTAIN-

(a) A STATEMENT OF WHETHER THE APPLICANT, ANY SUBSIDIARY, AFFILIATE, OR PERSONS CONTROLLED BY OR UNDER COMMON CONTROL WITH THE APPLICANT HAS:

(1) HAD A FEDERAL OR STATE MINING PERMIT SUSPENDED OR REVOKED IN THE LAST 5 YEARS; OR,

(2) FORFEITED A MINING BOND SIMILAR OR SECURITY DEPOSITED IN LIEU OF BOND.

RESPONSE:

No Federal or State mining permit held by the applicant or any subsidiary, affiliate, or persons controlled by or under common control with the applicant has been suspended or revoked, nor has any bond or similar security deposited in lieu of bond been forfeited.

(b) IF ANY SUCH SUSPENSION, REVOCATION, OR FORFEITURE HAS OCCURRED, A STATEMENT OF THE FACTS INVOLVED, INCLUDING-

(1) IDENTIFICATION NUMBER AND DATE OF ISSUANCE OF THE PERMIT OR DATE AND AMOUNT OF BOND OR SIMILAR SECURITY;

(2) IDENTIFICATION OF THE AUTHORITY THAT SUSPENDED OR REVOKED A PERMIT OR FORFEITED A BOND AND THE STATED REASONS FOR THAT ACTION;

(3) THE CURRENT STATUS OF THE PERMIT, BOND, OR SIMILAR SECURITY INVOLVED;

(4) THE DATE, LOCATION, AND TYPE OF ANY ADMINISTRATIVE OR JUDICIAL PROCEEDINGS INITIATED CONCERNING THE SUSPENSION, REVOCATION, OR FORFEITURE; AND

(5) THE CURRENT STATUS OF THESE PROCEEDINGS.

RESPONSE:
This Rule does not apply due to the negative response to Rules UMC 782.14(a)1 & 2.

(c) A LISTING OF EACH VIOLATION NOTICE RECEIVED BY THE APPLICANT IN CONNECTION WITH ANY UNDERGROUND OR SURFACE COAL MINING ACTIVITIES DURING THE 3-YEAR PERIOD BEFORE THE APPLICATION DATE, FOR VIOLATIONS OF ANY LAW, RULE, OR REGULATION OF THE UNITED STATES, OR OF ANY STATE LAW, RULE, OR REGULATION ENACTED PURSUANT TO FEDERAL LAW, RULE, OR REGULATION, OR OF ANY PROVISION OF THE ACT, PERTAINING TO AIR OR WATER ENVIRONMENTAL PROTECTION. THE APPLICATION SHALL ALSO CONTAIN A STATEMENT REGARDING EACH VIOLATION NOTICE, INCLUDING-

(1) THE DATE OF ISSUANCE AND IDENTITY OF THE ISSUING DIVISION, DEPARTMENT, OR AGENCY;

(2) A BRIEF DESCRIPTION OF THE PARTICULAR VIOLATION ALLEGED IN THE NOTICE;

(3) THE DATE, LOCATION, AND TYPE AND ANY ADMINISTRATIVE OR JUDICIAL PROCEEDINGS INITIATED CONCERNING THE VIOLATION, INCLUDING, BUT NOT LIMITED TO, PROCEEDINGS INTITIATED BY THE APPLICANT TO OBTAIN ADMINISTRATIVE OR JUDICIAL REVIEW OF THE VIOLATIONS;

(4) THE CURRENT STATUS OF THE PROCEEDINGS AND OF THE VIOLATION NOTICE; AND

(5) THE ACTIONS, IF ANY, TAKEN BY THE APPLICANT TO ABATE THE VIOLATION.

RESPONSE:

The application has received 11 violation notices for non-compliance in the three years preceeding this permit application. Table 1, Applicant's Violations and Their Status, lists all notices received by the applicant in connection with the underground mining activities for violations of laws, rules, and regulations pertaining to environmental protection beginning September, 1983. All violations have been abated and fines paid on time except for the latest violation N86-10-4-1 which is in the assessment process.

UMC 782.15 RIGHT OF ENTRY AND OPERATION INFORMATION

(a) EACH APPLICATION SHALL CONTAIN A DESCRIPTION OF THE DOCUMENTS UPON WHICH THE APPLICANT BASES HIS OR HER LEGAL RIGHT TO ENTER AND BEGIN UNDERGROUND COAL MINING ACTIVITIES IN THE PERMIT AREA AND WHETHER THAT

RIGHT IS THE SUBJECT OF PENDING LITIGATION. THE DESCRIPTION SHALL IDENTIFY THOSE DOCUMENTS BY TYPE AND DATE OF EXECUTION, IDENTIFY THE SPECIFIC LANDS TO WHICH THE DOCUMENT PERTAINS, AND EXPLAIN THE LEGAL RIGHTS CLAIMED BY THE APPLICANT.

RESPONSE:

The following documents support Plateau Mining Company's right of entry and operation in the permit area. That right is not the subject of pending litigation.

- Plateau Mining Company Incorporated State of Delaware August 26, 1982

- State of Utah Business License

- Carbon County License No. 0085

- State Tax Commission License and Account No. D-07179

- Plateau Mining Company fee land located in Carbon County, State of Utah, situated in the Salt Lake Meridian, T15S, R8E as follows:

Section 2; SW-1/4 SW-1/4

Section 5; SW-1/4 SW-1/4

Section 7; S-1/2 S-1/2 SE-1/4

Section 8; S-1/2 S-1/2 SW-1/4; E-1/2 E-1/2 SW-1/4; S-1/2 SW-1/4 SE-1/4

Section 9; SW-1/4 SW-1/4; SE-1/4 SE-1/4

Section 10; S-1/2 S-1/2 except parcel described as: Beginning at a point North 0^{o} 01' West 1125.92 feet from the S-1/4 corner, said point being on the North Right-of-Way of the County Road; thence North 0^{o} 01' West 194.08 feet; thence North 89^{o} 51' East 329.36 feet; thence South 0^{o} 01' East 244.53 feet to a point on the North Right-of-Way line of said County Road; thence North westerly 340 feet more or less along said Right-or-Way line to point of beginning. Contains 1.65 acres.
and NE-1/4 SW-1/4

Section 17; N-1/2 N1/2
Deed dated October 21, 1971.

- Federal Coal Lease No. U-13097 issued May 1, 1974
  Salt Lake Base and Meridian
  T15S, R7E,
  Sec. 14 S-1/2 E-1/2 NE-1/4,SW-1/4 NE-1/4.
  Sec. 23 all;
  Sec. 25 W-1/2 NW-1/4;
  Sec. 26 N-1/2;

- Federal Coal Lease No. UTU-64263 issued April 1, 1991.
  Salt Lake Base and Meridian
  T14S, R7E,
  Sec 34, lots 3,4, N-1/2 SE1/4;
  T15S, R7E,
  Sec. 2, lots 2-7, 10-12, SW-1/4, W-1/2 SE-1/4;
  Sec. 3, lots 1, 2, 7-10, E-1/2 SE-1/4, E-1/2 W-1/2 SE-1/4;
  Sec. 10, E-1/2 E-1/2, E-1/2 NW-1/4 NE-1/4;
  Sec. 11, W-1/2, W-1/2 E-1/2;
  Sec. 14, NW-1/4, NW-1/4 NE-1/4;

AMENDMENT 10

APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

By: pgl date 11/8/91

- Federal Coal Lease SL 031286 issued September 4, 1982.
  Salt Lake Base and Meridian
  T15S, R7E, Sec. 1 S-1/2; Sec. 2 SE-1/4 SE-1/4;
  Sec. 11 E-1/2 NE-1/4, NE-1/4 SE-1/4; Sec. 12 all;
  Sec. 13 N-1/2
  T15S, R8E, Sec. 7 W-1/2; Sec. 8 SW-1/4 NW-1/4;

- Federal Coal Lease U-7949 issued September 1, 1970.
  Salt Lake Base and Meridian
  T15S, R8E Sec. 8 SE-1/4 SE-1/4
  Sec. 17 S-1/2 NE-1/4, SE-1/4;
  Sec. 20 NE-1/4; Sec. 21 E-1/2 NW-1/4

- State of Utah Coal Lease 22729 issued March, 1965.
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 16 S-1/2 NW-1/4, S-1/2.
  Returned to State of Utah 1986

- Federal Coal Lease U-37045 issued April 1, 1980
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 5, Lots 4, 5, 12, NW-1/4 SW-1/4;
  Sec. 6, Lots 2, 3, 6, 7, 9, 10, 11, 14, E-1/2
  SW-1/4, SE-1/4; Sec. 7, NE-1/4 NE-1/4;
  Sec. 8, NW-1/4 NW-1/4.

- State of Utah Special Use Lease Agreement No. 288 issued November 1, 1972.
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 16 all.

- Federal Right-of-Way U-47965 issued October 14, 1981.
  Salt Lake Base and Meridian
  Sec. 15, T15S, R8E, the N-1/2 NW-1/4 NW-1/4 NE-1/4;
  SW-1/4 NW-1/4 NW-1/4 NE-1/4, N-1/2 NE-1/4 NW-1/4,
  SE-1/4 NE-1/4 NW-1/4 NW-1/4, N-1/2 N-1/2 S-1/2 NE-1/4
  NW-1/4, N-1/2 NE-1/4 NW-1/4 NW-1/4.

Revised 12/15/86

- Federal Coal Lease SL 031286 issued September 4, 1982.
  Salt Lake Base and Meridian
  T15S, R7E, Sec. 1 S-1/2; Sec. 2 SE-1/4 SE-1/4;
  Sec. 11 E-1/2 NE-1/4, NE-1/4 SE-1/4; Sec. 12 all;
  Sec. 13 N-1/2
  T15S, R8E, Sec. 7 W-1/2; Sec. 8 SW-1/4 NW-1/4.

- Federal Coal Lease U-7949 issued September 1, 1970.
  Salt Lake Base and Meridian
  T15S, R8E Sec. 8 SE-1/4 SE-1/4
  Sec. 17 S-1/2 NE-1/4; SE-1/4;
  Sec. 20 NE-1/4; Sec. 21 E-1/2 NW-1/4.

- State of Utah Coal Lease 22729 issued March, 1965.
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 16 S-1/2 NW-1/4; S-1/2.
  Returned to State of Utah 1986

- Federal Coal Lease U-37045 issued April 1, 1980
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 5, Lots 4, 5, 12, NW-1/4 SW-1/4;
  Sec. 6, Lots 2, 3, 6, 7, 9, 10, 11, 14, E-1/2,
  SW-1/4, SE-1/4; Sec. 7, NE-1/4 NE-1/4;
  Sec. 8, NW-1/4 NW-1/4.

- State of Utah Special Use Lease Agreement No. 288 issued November 1, 1972.
  Salt Lake Base and Meridian
  T15S, R8E, Sec. 16 all.

- Federal Right-of-Way U-47965 issued October 14, 1981.
  Salt Lake Base and Meridian
  Sec. 15, T15S, R8E, the N-1/2 NW-1/4 NW-1/4 NE-1/4;
  SW-1/4 NW-1/4 NW-1/4 NE-1/4, N-1/2 NE-1/4 NW-1/4,
  SE-1/4 NE-1/4 NW-1/4 NW-1/4, N-1/2 N-1/2 S-1/2 NE-1/4
  NW-1/4, N-1/2 NE-1/4 NW-1/4 NW-1/4.

Revised 6/15/87

- Federal Right-of-Way U-52409 issued November 1, 1984.

Salt Lake Base and Meridian

Sec 15, T15S, R8E

Beginning at a point 7.75 feet north and 955.88 feet east of the north 1/4 corner of Section 15, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence N 89°32'07" E 460.00 feet; thence S 28°17;26" E 849.46 feet; thence S 85°45'02" E 205.39 feet; thence east 160.73 feet; thence S 29°05' E 455.15 feet; thence S 76°14'52" W 411.58 feet; thence N 70°00' W 550.00 feet; thence S 56°38'03" W 183.31 feet; thence N 45°00' W 348.20 feet; thence N 70°00' W 140.15 feet; thence north 888.83 feet more or less to the point of beginning containing 23.2 acres, situated in Carbon County, Utah.

- Federal Right-of-Way U-39779 issued April 11, 1979

Salt Lake Base and Meridian

Sec 9, T15S, R8E

Parcel A - A strip of land, to be used as an access right-of-way, 100 feet wide, lying on each side of the following described line: Beginning at a point which is N 55°11'56" E 1602.57 feet from the southwest corner of Section 9, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence N 67°47'21" E 1026.86 feet; thence N 76°16'16" E 678.38 feet; thence S 86°10'44" E 540.20 feet; thence N 63°43'55" E 538.09 feet to a point which is N 38°35'33" W 2110.17 feet from the southeast corner of said Section 9. Contains 6.4 acres.

Parcel B - A strip of land to be used as an access right-of-way, 100 feet wide, lying on each side of the following described line: Beginning at a point which is N 81°37'41" E 1329.89 feet from the southwest corner of Section 9, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence N 57°47'30" E 1675.75 feet; thence N 77°50'51" E 1106.8 feet; thence N 50°34'44" E 170.8 feet to a point which is N 43°00'14" W 1929.84 feet from the southeast corner of said Section 9. Contains 6.8 acres.

Revised 6/15/87

Parcel 1 - A strip of land, to be used as a runoff control structure right-of-way, 5 feet in width, lying 2.5 feet on each side of the following described line: Beginning at a point which is N 77°44'22" E 1731.19 feet from the southwest corner of Section 9, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence S 30°56'57" E 285.00 feet to a point which is N 81°40'55" W 801.48 feet from the south quarter corner of said Section 9. Contains 0.03 acres more or less.

Parcel 2 - A strip of land, to be used as a runoff control structure right-of-way, 5 feet in width, lying 2.5 feet on each side of the following described line: Beginning at a point which is N 64°28'45" E 3276.67 feet from the southwest corner of Section 9, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence S 23°02'36" E 175.00 feet to a point which is N 61°07'36" W 2555.63 feet from the southeast corner of said Section 9. Contains 0.02 acres more or less.

Parcel 3 - A parcel of land, to be used as an access and utility right-of-way, beginning at a point which is N 85°39'47" W 1319.82 feet from the southeast corner of Section 9, Township 15 South, Range 8 East, Salt Lake Base and Meridian, and running thence S 0°01'00" E 104.50 feet; thence S 89°47'46" W 648.00 feet; thence N 80°38'27" E 656.73 feet to the point of beginning. Contains 0.78 acres more of less.

- Federal Right-of-Way U-48025 issued May 25, 1982

  Salt Lake Base and Meridian
  Sec 15, T15S, R8E

  A strip of land, to be used as a power transmission line right-of-way, 20 feet in width, lying 10 feet on each side of the following described line: Beginning at a point which is N 89°31'59" E 330.68 feet from the northwest corner of Section 15, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence S 31°17'36" W 636.31 feet to a point which is S 77°53'09" W 2679.87 feet from the north quarter corner of said Section 15. Contains 0.29 acres more or less.

- Access Road Usage Agreement With Utah Railway Company issued January 1, 1985

  Salt Lake Base and Meridian
  20 foot corridor in Sections 11 and 15, T15S, R8E, lying parallel to the URR spur track serving Plateau Mining Company's loadout silo.

- Deed dated December 13, 1985 between U.S. Fuel Company, Grantor and Plateau Mining Company Grantor covering the coal ownership in the following land:

  <u>Township 15 South, Range 8 East, SLM</u>

  Section 18:
  That part lying fifty (50) feet north of U.S. Fuel's 13 East 8 North mining sections in the King IV Mine subsurface workings, at September 15, 1985, more specifically described as follows:

  Beginning at the northwest section corner of Section 18, Township 15 South, Range 8 East, SLM, and running along the north boundary line of Section 18 a distance of 5,186.96 feet to the northeast section corner of Section 18, thence south along the east boundary line of Section 18 a distance of 4,118 feet to a line which is 50 feet north of the most northerly excavation of the 13 East

- Federal Right-of-Way U-48025 issued May 25, 1982
  Salt Lake Base and Meridian
  Sec 15, T15S, R8E

  A strip of land, to be used as a power transmission line right-of-way, 20 feet in width, lying 10 feet on each side of the following described line: Beginning at a point which is N 89°31'59" E 330.68 feet from the northwest corner of Section 15, Township 15 South, Range 8 East, Salt Lake Base and Meridian; thence S 31°17'36" W 636.31 feet to a point which is S 77°53'09" W 2679.87 feet from the north quarter corner of said Section 15. Contains 0.29 acres more or less.

- Access Road Usage Agreement With Utah Railway Company issued January 1, 1985
  Salt Lake Base and Meridian
  20 foot corridor in Sections 11 and 15, T15S, R8E, lying parallel to the URR spur track serving Plateau Mining Company's loadout silo.

- Deed dated December 13, 1985 between U.S. Fuel Company Grantor and Plateau Mining Company Grantor covering the coal ownership in the following land:

  Township 15 South, Range 8 East, SLM

  Section 18:
  That part lying fifty (50) feet north of U.S. Fuel's 13 East 8 North mining sections in the King IV Mine subsurface workings, at September 15, 1985, more specifically described as follows:

Beginning at the northwest corner of Section 18, Township 15 South, Range 8 East, Salt Lake base and meridian; thence N87°01'47"E along the section line 2558.26 feet to the North 1/4 corner of said Section 18,

thence N87°02'21"E along the section line 2629.85 feet to the northeast corner of said Section 18, thence S0°17'55"E along the section line 2755.81 feet to the East 1/4 corner of said Section 18, thence S0°12'05"E along the section line 1362.19 feet, thence west 3618.00 feet, thence north 268.00 feet, thence west 1641.59 feet to the west boundary of said Section 18, thence N0°10'23"E along the section line 962.79 feet to the West 1/4 corner of said Section 18, thence N1°14'00"E along the section line 2619.37 feet more or less to the point of beginning. Containing 468.07 acres.

- Deed dated April 1, 1967, between Wayne B. Baker, et ux Grantors and Plateau Mining Ltd., Grantee covering coal ownership in the following land:

  Township 15 South, Range 8 East

  Section 7: NW¼ NE¼, S½ NE¼, N½ SE¼, N½ S½ SE¼

  Section 8: NW¼ SW¼, N½ SW¼ SW¼, NW¼ SE¼ SW¼, W½ NE¼ SW¼

  Section 17: S½ NW¼, NW¼ SW¼ North of the Right Fork of the North Fork of Miller Creek

  Containing 430.00 Acres more or less

- Warranty Deed dated June 26, 1984, between Harvey C. Smith, et al, Grantors and Getty Mining Company, Grantee

  Township 15 South, Range 8 East

  Section 10: 1.65 acres out of the SW¼ SE¼ described as follows: Beginning at a point north 0 degrees 01' west 1125.92 feet from the south quarter corner, said point being on the north right-of-way of the county road; thence north 0 degrees 01' west 194.08 feet; thence north 89 degrees 51' east 329.36 feet; thence south 0 degrees 01' east 244.53 feet to a point on the north right-or-way line of said county road; thence north westerly 340 feet more or less along said right-of-way line to the point of beginning.

- Quitclaim Deed dated August 27, 1986, between Clifford Smith, et ux, Grantors and Plateau Mining Company, Grantee.

  Township 15 South, Range 8 East, SLM

  Section 10:

  Beginning at a point on the east boundary line of the SW/4 SW/4, 602.9 feet north 0 degrees 01' west of the southeast corner of the

SW/4 SW/4, Section 10, running thence north 0 degrees 01' west 305.97 feet along said east boundary line; thence 200 feet north 78 degrees 39' east; thence 300 feet south 11 degrees 21' east; thence 260.13 feet south 78 degrees 39' west to the point of beginning.
Containing 1.58 acres, more or less, located in Carbon County, Utah

- Quitclaim Deed dated April 13, 1949 between Carbon County, Grantor and Lion Coal Company (predecessor through mergers) to Plateau Company, Grantee.
  Township 15 South, Range 8 East, SLM
  Section 17: NW¼ NW¼

- Warranty Deed dated June 28, 1984 between Clifford Smith, Grantor and Getty Mining Company, Grantee.
  Township 15 South, Range 8 East, SLM
  Section 9: NE/4 SE/4
  Section 10:
  NW/4 SE/4; A strip of land in the SE corner of the NW/4 SW/4 and more specifically described as:

  Beginning at a point which is 1347.88 feet north and 1302.24 feet east of the southwest corner of Section 10, Township 15 South, Range 8 East, Salt Lake base and meridian; said point being the center of the southwest quarter of Section 10; said point having Utah state Plane - Central Zone coordinates of N-436,651.71, E-2,136,348.04; thence south 88 degrees 48'48" west 700 feet to a point with State Plane coordinates of N-436,637.21, E-2,135,648. A; Thence north 65 degrees 44'32" east 765.48 feet to a point with State Plane coordinates of N-436,951.70, E-2,136,346.08; thence south 0 degrees 22'30" east 300 feet to the point of beginning; containing 2.41 acres, more or less.
  Containing 82.41 acres, more or less, located in Carbon County, Utah.

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- Cyprus - Certificate of Ownership and Merger dated August 30, 1985

(b) FOR UNDERGROUND COAL MINING ACTIVITIES WHERE THE ASSOCIATED SURFACE OPERATIONS INVOLVE THE SURFACE MINING OF COAL AND THE PRIVATE MINERAL ESTATE TO BE MINED HAS BEEN SEVERED FROM THE PRIVATE SURFACE ESTATE, THE APPLICATION SHALL ALSO PROVIDE, FOR LANDS TO BE AFFECTED BY THOSE OPERATIONS WITHIN THE PERMIT AREA-

(1) A COPY OF THE WRITTEN CONSENT OF THE SURFACE OWNER OF THE EXTRACTION OF COAL BY SURFACE MINING METHODS; OR

(2) A COPY OF THE DOCUMENT OF CONVEYANCE THAT EXPRESSLY GRANTS OR RESERVES THE RIGHT TO EXTRACT THE COAL BY SURFACE MINING METHODS; OR

(3) IF THE CONVEYANCE DOES NOT EXPRESSLY GRANT THE RIGHT TO EXTRACT COAL BY SURFACE MINING METHODS, DOCUMENTATION THAT UNDER THE APPLICABLE STATE LAW, THE APPLICANT HAS THE LEGAL AUTHORITY TO EXTRACT THE COAL BY THOSE METHODS.

RESPONSE:
The extraction of coal by surface mining methods is not proposed in this permit application. Therefore, the requirements of this rule are not applicable.

(c) NOTHING IN THIS SECTION SHALL BE CONSTRUED TO AFFORD THE DIVISION THE AUTHORITY TO ADJUDICATE PROPERTY TITLE DISPUTES.

RESPONSE:
PMC with this permit application does not construe this submittal material as vesting in the DOGM or the Board of Oil, Gas and Mining the jurisdiction to adjudicate property rights disputes.

- Cyprus - Certificate of Ownership and Merger dated August 30, 1985

Prior to initiating additional surface disturbance within the permit area on lands administered by the BLM, which are not in the control of PMC, PMC will obtain the necessary rights-of-way or other rights as required by the BLM.

(b) FOR UNDERGROUND COAL MINING ACTIVITIES WHERE THE ASSOCIATED SURFACE OPERATIONS INVOLVE THE SURFACE MINING OF COAL AND THE PRIVATE MINERAL ESTATE TO BE MINED HAS BEEN SEVERED FROM THE PRIVATE SURFACE ESTATE, THE APPLICATION SHALL ALSO PROVIDE, FOR LANDS TO BE AFFECTED BY THOSE OPERATIONS WITHIN THE PERMIT AREA-

(1) A COPY OF THE WRITTEN CONSENT OF THE SURFACE OWNER OF THE EXTRACTION OF COAL BY SURFACE MINING METHODS; OR

(2) A COPY OF THE DOCUMENT OF CONVEYANCE THAT EXPRESSLY GRANTS OR RESERVES THE RIGHT TO EXTRACT THE COAL BY SURFACE MINING METHODS; OR

(3) IF THE CONVEYANCE DOES NOT EXPRESSLY GRANT THE RIGHT TO EXTRACT COAL BY SURFACE MINING METHODS, DOCUMENTATION THAT UNDER THE APPLICABLE STATE LAW, THE APPLICANT HAS THE LEGAL AUTHORITY TO EXTRACT THE COAL BY THOSE METHODS.

RESPONSE:

The extraction of coal by surface mining methods is not proposed in this permit application. Therefore, the requirements of this rule are not applicable.

(c) NOTHING IN THIS SECTION SHALL BE CONSTRUED TO AFFORD THE DIVISION THE AUTHORITY TO ADJUDICATE PROPERTY TITLE DISPUTES.

RESPONSE:

PMC with this permit application does not construe this submittal material as vesting in the DOGM or the Board of Oil, Gas and Mining the jurisdiction to adjudicate property rights disputes.

UMC 782.16 RELATIONSHIP TO AREAS DESIGNATED UNSUITABLE FOR MINING

(a) EACH APPLICATION SHALL CONTAIN A STATEMENT OF AVAILABLE INFORMATION ON WHETHER THE PROPOSED PERMIT AREA IS WITHIN AN AREA DESIGNATED UNSUITABLE FOR THE SURFACE EFFECTS OF UNDERGROUND COAL MINING ACTIVITIES UNDER UMC 764, OR UNDER STUDY FOR DESIGNATION IN AN ADMINISTRATIVE PROCEEDING INITIATED OR UNDER THOSE PARTS.

RESPONSE

There are no areas designated as unsuitable for mining within or adjacent to the permit area. This information was obtained by personal communication with Lowell Braxton, DOGM, December 17, 1986; Jim Dryden, BLM, December 18, 1986; and Walt Nowak, USFS, December 17, 1986.

(b) IF AN APPLICANT CLAIMS THE EXEMPTION IN UMC 786.19(d)(2), THE APPLICATION SHALL CONTAIN INFORMATION SUPPORTING THE APPLICANT'S ASSERTION THAT IT MADE SUBSTANTIAL LEGAL AND FINANCIAL COMMITMENTS BEFORE JANUARY 4, 1977, CONCERNING THE PROPOSED UNDERGROUND MINING ACTIVITIES.

RESPONSE:

PMC does not claim an exemption for areas designated unsuitable for mining under rule UMC 786.19(d)(2).

(c) IF AN APPLICANT PROPOSES TO CONDUCT OR LOCATE SURFACE OPERATIONS OR FACILITIES WITHIN 300 FEET OF AN OCCUPIED DWELLING, THE APPLICATION SHALL INCLUDE THE WAIVER OF THE OWNER OF THE DWELLING AS REQUIRED IN UMC 761.12(E).

RESPONSE:

PMC does not propose to conduct or locate surface facilities within 300 feet of an occupied dwelling.

782.17 PERMIT TERM INFORMATION

(a) EACH APPLICATION SHALL STATE THE ANTICIPATED OR ACTUAL STARTING AND TERMINATION DATE OF EACH PHASE OF THE UNDERGROUND COAL MINING ACTIVITIES AND THE ANTICIPATED NUMBER OF ACRES OF SURFACE LANDS TO BE AFFECTED, AND THE

HORIZONTAL AND VERTICAL EXTENT OF PROPOSED UNDERGROUND MINE WORKINGS, FOR EACH PHASE OF MINING AND OVER THE TOTAL LIFE OF THE PERMIT.

RESPONSE:

The mining dates are shown on Maps 4, 5 and 6, Mine Plan for the Hiawatha, Third and Wattis Seams, and discussed in response to UMC 784.11 and UMC 784.23. The horizontal extent of mining can be seen on the maps mentioned above, and the vertical extent can be seen on Maps 7, 8 and 9, Hiawatha, Third and Wattis Seam Isopach Maps, respectively (Confidential Volume).

(b) IF THE APPLICANT PROPOSES TO CONDUCT THE UNDERGROUND COAL MINING ACTIVITIES IN EXCESS OF 5 YEARS, THE APPLICATION SHALL CONTAIN THE INFORMATION NEEDED FOR THE SHOWING REQUIRED UNDER UMC 786.25(a).

RESPONSE:

This application is for a 5 year term.

UMC 782.18 PERSONAL INJURY AND PROPERTY DAMAGE INSURANCE INFORMATION

EACH APPLICATION SHALL CONTAIN EITHER A CERTIFICATE OF LIABILITY INSURANCE OR EVIDENCE THAT THE SELF-INSURANCE REQUIREMENTS IN UMC 806.14 ARE SATISFIED.

RESPONSE:

PMC, through its parent corporation, carries public liability and property damage insurance in due force. A copy of the certificate of insurance is presented in Exhibit 2, Certificate of Insurance.

UMC 782.19 IDENTIFICATION OF OTHER LICENSES AND PERMITS

EACH APPLICATION SHALL CONTAIN A LIST OF ALL OTHER LICENSES AND PERMITS UNDER APPLICABLE STATE AND FEDERAL LAND-USE, AIR AND WATER QUALITY, WATER

HORIZONTAL AND VERTICAL EXTENT OF PROPOSED UNDERGROUND MINE WORKINGS, FOR EACH PHASE OF MINING AND OVER THE TOTAL LIFE OF THE PERMIT.

RESPONSE:

The mining dates are shown on Maps 4, 5 and 6, Mine Plan for the Hiawatha, Third and Wattis Seams, and discussed in response to UMC 784.11 and UMC 784.23. The horizontal extent of mining can be seen on the maps mentioned above, and the vertical extent can be seen on Maps 7, 8 and 9, Hiawatha, Third and Wattis Seam Isopach Maps, respectively (Confidential Volume).

(b) IF THE APPLICANT PROPOSES TO CONDUCT THE UNDERGROUND COAL MINING ACTIVITIES IN EXCESS OF 5 YEARS, THE APPLICATION SHALL CONTAIN THE INFORMATION NEEDED FOR THE SHOWING REQUIRED UNDER UMC 786.25(a).

RESPONSE:

This renewal is for a 5 year term.

UMC 782.18 PERSONAL INJURY AND PROPERTY DAMAGE INSURANCE INFORMATION

EACH APPLICATION SHALL CONTAIN EITHER A CERTIFICATE OF LIABILITY INSURANCE OR EVIDENCE THAT THE SELF-INSURANCE REQUIREMENTS IN UMC 806.14 ARE SATISFIED.

RESPONSE:

PMC, through its parent corporation Cyprus Western Coal Company, carries public liability and property damage insurance in due force. A copy of the certificate of insurance is presented in Exhibit 2, Certificate of Insurance.

UMC 782.19 IDENTIFICATION OF OTHER LICENSES AND PERMITS

EACH APPLICATION SHALL CONTAIN A LIST OF ALL OTHER LICENSES AND PERMITS UNDER APPLICABLE STATE AND FEDERAL LAND-USE, AIR AND WATER QUALITY, WATER

RIGHTS AND HEALTH AND SAFETY LAWS AND REGULATIONS NEEDED BY THE APPLICANT TO CONDUCT THE PROPOSED UNDERGROUND COAL MINING ACTIVITIES. THIS LIST SHALL IDENTIFY EACH LICENSE AND PERMIT BY-

(a) TYPE OF PERMIT OR LICENSE;

(b) NAME AND ADDRESS OF ISSUING AUTHORITY;

(c) IDENTIFICATION NUMBERS OF APPLICATIONS FOR THOSE PERMITS OR LICENSES OR, IF ISSUED, THE IDENTIFICATION NUMBERS OF THE PERMITS OR LICENSES; AND

(d) IF A DECISION HAS BEEN MADE, THE DATE OF APPROVAL OR DISAPPROVAL BY EACH ISSUING AUTHORITY.

RESPONSE:

Permits and licenses dealing with land use, air and water quality and health and safety laws and regulations are listed in Table 2, Permits and Licenses held by PMC. Water Rights are listed in Table 9, Ground Water Rights Within and Adjacent to the Plateau Mining Company Mine Plan Area.

A permit for discharging water from the PMC operations areas has been obtained and is available as Exhibit 37, NPDES Discharge Permit. Because of the sequence of construction, the NPDES Permit point-source discharge point numbers do not all coincide with sediment pond numbers. The Mudwater Canyon mine discharge point is numbered 001 in the NPDES permit; Treatment Facility Number 1 is numbered 002 in the NPDES permit; Sediment Pond Number 2 is 009; Sediment Pond 3 is 003; Sediment Pond 4 is 004; Sediment Pond 5 is 005; Sediment Pond 6 is 006; Sediment Pond 7 is 007; and Sediment Pond 8 is 008.

UMC 782.20 IDENTIFICATION OF LOCATION OF PUBLIC OFFICE FOR FILING OF APPLICATION

EACH APPLICATION SHALL IDENTIFY, BY NAME AND ADDRESS, THE PUBLIC OFFICE

WHERE THE APPLICANT SHALL SIMULTANEOUSLY FILE A COPY OF THE APPLICATION FOR PUBLIC INSPECTION UNDER UMC 786.11(d).

RESPONSE:

In compliance with UMC 786.11(d), a copy of this permit application will be filed at the Carbon County Recorders Office in the Carbon County Court House in Price, Utah 84501, and at the Emery County Recorders Office in the Emery County Court House in Castle Dale, Utah 84513. Information considered confidential will not be included in these documents.

UMC 782.21 NEWSPAPER ADVERTISEMENT AND PROOF OF PUBLICATION

A COPY OF THE NEWSPAPER ADVERTISEMENT OF THE APPLICATION AND PROOF OF PUBLICATION OF THE ADVERTISEMENT SHALL BE FILED WITH THE DIVISION AND MADE A PART OF THE COMPLETE APPLICATION NOT LATER THAN 4 WEEKS AFTER THE LAST DATE OF PUBLICATION REQUIRED UNDER UMC 786.11(a).

RESPONSE:

In compliance with UMC 786.11(a), newspaper advertisements will be published in the Sun Advocate and Emery County Progress and will appear four consecutive weeks. A copy of the proposed notice is provided as Exhibit 3, Proof of Publication. Proof of publication and copies of the notices will be filed with the DOGM and made a part of this application when available.

PART UMC 783 - UNDERGROUND COAL MINING PERMIT APPLICATIONS - REQUIREMENTS FOR INFORMATION ON ENVIRONMENTAL RESOURCES

UMC 783.1 SCOPE

THIS PART ESTABLISHES THE REQUIREMENTS FOR THE ENVIRONMENTAL RESOURCES CONTENTS OF APPLICATIONS FOR PERMITS FOR UNDERGROUND COAL MINING ACTIVITIES.

UMC 783.2 OBJECTIVES

THE OBJECTIVES OF THIS PART ARE TO ENSURE THAT EACH APPLICATION PROVIDES TO THE DIVISION A COMPLETE AND ACCURATE DESCRIPTION OF THE ENVIRONMENTAL RESOURCES THAT MAY BE IMPACTED OR AFFECTED BY PROPOSED UNDERGROUND COAL MINING ACTIVITIES.

UMC 783.4 RESPONSIBILITIES

(a) IT IS THE RESPONSIBILITY OF THE APPLICANT TO PROVIDE, EXCEPT WHERE SPECIFICALLY EXEMPTED IN THIS PART, ALL INFORMATION REQUIRED BY THIS PART IN THE APPLICATION.

(b) IT IS THE RESPONSIBILITY OF STATE AND FEDERAL GOVERNMENT AGENCIES TO PROVIDE INFORMATION FOR APPLICATIONS AS SPECIFICALLY REQUIRED BY THIS PART.

RESPONSE:

Within this section of the permit application, Plateau Mining Company (PMC) provides a complete and accurate description of the environmental resources that either have been or may be impacted or affected by the underground mining operations and the associated surface activities.

UMC 783.11 GENERAL REQUIREMENTS

EACH PERMIT APPLICATION SHALL INCLUDE A DESCRIPTION OF THE EXISTING, PRE-MINING ENVIRONMENTAL RESOURCES WITHIN THE PROPOSED MINE PLAN AREA AND ADJACENT AREAS THAT MAY BE AFFECTED OR IMPACTED BY THE PROPOSED UNDERGROUND COAL MINING ACTIVITIES.

RESPONSE:

PMC has included in this permit application a description of the pre-mining environmental resources existing within the proposed mine plan area and adjacent areas which may be affected or impacted by the planned mining activities. These descriptions can be found in the responses to UMC 783.13 through 783.22 which follow this section. Information presented in these sections was obtained from site specific studies, records, personal communication with reliable individuals, agency personnel, and information gathered during the previous permit term.

UMC 783.12 GENERAL ENVIRONMENTAL RESOURCES INFORMATION

EACH APPLICATION SHALL DESCRIBE AND IDENTIFY-

(a) THE SIZE, SEQUENCE, AND TIMING OF THE SUBAREAS OF THE MINE PLAN AREA FOR WHICH IT IS ANTICIPATED THAT INDIVIDUAL PERMITS FOR MINING WILL BE REQUESTED OVER THE ESTIMATED TOTAL LIFE OF THE PROPOSED UNDERGROUND COAL MINING ACTIVITIES; AND

RESPONSE:

Mining operations at PMC are anticipated to continue beyond the year 2000. PMC will need to renew the mining permit every 5 years; this will entail at least 4 renewals to extract the coal reserves controlled. Because of the regulated 5-year permit term, the underground mining has been grouped in 5-year increments. More detail is found in the response to UMC 784, Reclamation and Operations Plan.

Revised 12/15/86

Additional areas of interest which may be incorporated into the permit are as follows:

1. Possible acquisition of the Castle Valley Ridge proposed Federal lease;
2. Possible acquisition of Tie Fork proposed Federal lease; and

(b) THE NATURE OF CULTURAL AND HISTORIC RESOURCES LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES AND KNOWN ARCHEOLOGICAL SITES WITHIN THE PROPOSED MINE PLAN AND ADJACENT AREAS. THE DESCRIPTION SHALL BE BASED ON ALL AVAILABLE INFORMATION, INCLUDING, BUT NOT LIMITED TO, DATA OF STATE AND LOCAL ARCHEOLOGICAL, HISTORIC, AND CULTURAL PRESERVATION AGENCIES.

RESPONSE:

Cultural and historic resources on and adjacent to the PMC operation were inventoried on 4 separate occasions. Areas inventoried can be seen on Map 3, Coal Ownership and Cultural Resource Survey Areas. The first inventory conducted in 1980 and 1981 by Archeological-Environmental Research Corporation (AERC) of Salt Lake City, Utah, comprised Chapter 5 of the original permit. This chapter along with the pertinent responses in the Supplement resulting from the initial submittal are presented in Exhibit 4, Historical and Cultural Resources.

The second inventory of Historic and Cultural resources was performed in May, 1982 by K.K. Pelli Cultural Resource Management Specialists of Moab, Utah. This study was performed in conjunction with the Unit Train Loadout. This report can be found in Exhibit 4, Historical and Cultural Resources.

The third inventory was performed in November 1983 by Nickens and Associates of Montrose, Colorado in conjunction with the Unit Train

Loadout. This report is presented in Exhibit 4, Historical and Cultural Resources.

The fourth inventory was performed in November 1982 by P/S Scientific Inc., of Salt Lake City on the Corner Canyon Fan Breakout Area. This report is presented in Exhibit 4, Historical and Cultural Resources.

Review of this material confirms there are no sites eligible for nomination to the National Register of Historic Places within PMC's area of disturbance.

There are no surface facilities or disturbances planned on the "new lands" to be added with this PAP. Therefore, no additional cultural historical investigations are necessary.

UMC 783.13 DESCRIPTION OF HYDROLOGY AND GEOLOGY: GENERAL REQUIREMENTS

(a) EACH APPLICATION SHALL CONTAIN A DESCRIPTION OF THE GEOLOGY, HYDROLOGY, AND WATER QUALITY AND QUANTITY OF ALL LANDS WITHIN THE PROPOSED MINE PLAN AREA, THE ADJACENT AREA, AND THE GENERAL AREA. THE DESCRIPTION SHALL INCLUDE INFORMATION OF THE CHARACTERISTICS OF ALL SURFACE AND GROUND WATERS WITHIN THE GENERAL AREA, AND ANY WATER WHICH WILL FLOW INTO OR RECEIVE DISCHARGES OF WATER FROM THE GENERAL AREA. THE DESCRIPTION SHALL BE PREPARED

ACCORDING TO SECTIONS UMC 783.13 - 783.16 AND CONFORM TO THE FOLLOWING:

(1) INFORMATION ON HYDROLOGY, WATER QUALITY AND QUANTITY, AND GEOLOGY RELATED TO HYDROLOGY OF AREAS OUTSIDE THE PROPOSED MINE PLAN AREA AND WITHIN THE GENERAL AREA SHALL BE PROVIDED BY THE DIVISION, TO THE EXTENT THAT THIS DATA IS AVAILABLE FROM AN APPROPRIATE FEDERAL OR STATE AGENCY.

(2) IF THIS INFORMATION IS NOT AVAILABLE FROM THOSE AGENCIES, THE APPLICANT MAY GATHER AND SUBMIT THIS INFORMATION TO THE DIVISION AS PART OF THE PERMIT APPLICATION.

(3) THE PERMIT SHALL NOT BE APPROVED BY THE DIVISION UNTIL THIS INFORMATION IS MADE AVAILABLE IN THE APPLICATION.

(b) THE USE OF MODELING TECHNIQUES MAY BE INCLUDED AS PART OF THE PERMIT

APPLICATION, BUT THE SAME SURFACE AND GROUND WATER INFORMATION MAY BE REQUIRED FOR EACH SITE AS WHEN MODELS ARE NOT USED.

RESPONSE:

The permit area lies on the eastern edge of the Wasatch Plateau and contains coal seams within the Upper Cretaceous Blackhawk Formation which is a part of the Mesa Verde group of formations. Each item covered by the above regulation is discussed within this report in subsequent sections. Descriptions related to geology, ground water hydrologic conditions, and surface water hydrologic conditions are contained in the responses to UMC 783.14, 783.15 and 783.16, respectively. A discussion of surface and ground water quality is provided in response to UMC 783.15 and 783.16.

There are two major strata-bound aquifers in the Eastern Wasatch Plateau. One in the Starpoint Formation and the other in the North Horn Price River Formations. These strata-bound aquifers are modified by north-south normal faults which systematically dissect the plateau. These faults act as boundaries, or boundaries and conduits simultaneously. The faults define structurally controlled sub-regional hydrologic provinces or domains, as described in response to UMC 783.15.

UMC 783.14 GEOLOGY DESCRIPTION

(a) THE DESCRIPTION SHALL INCLUDE A GENERAL STATEMENT OF THE GEOLOGY WITHIN THE PROPOSED MINE PLAN AREA, DOWN TO AND INCLUDING THE FIRST AQUIFER TO BE AFFECTED BELOW THE LOWEST COAL SEAM TO BE MINED. THE GEOLOGY FOR AREAS PROPOSED TO BE AFFECTED BY SURFACE OPERATIONS AND FACILITIES, THOSE SURFACE LANDS OVERLYING COAL TO BE MINED, AND THE COAL TO BE MINED SHALL BE SEPARATELY DESCRIBED, AS FOLLOWS:

*(1) THE GEOLOGY OF THE STRATA OF OVERBURDEN TO BE REMOVED, DOWN TO AND INCLUDING THE STRATUM IMMEDIATELY BELOW ANY COAL SEAM TO BE MINED, AND THE GEOLOGY OF THE STRATA TO BE DISTURBED BY SURFACE OPERATIONS, SHALL BE DESCRIBED INCLUDING THE FOLLOWING DATA RESULTING FROM ANALYSES OF TEST

BORINGS, CORE SAMPLINGS OR OUTCROP SAMPLES, PROVIDED, HOWEVER, THAT TEST BORINGS, CORE SAMPLINGS AND REMOVAL OF OUTCROP SAMPLES DO NOT CONSTITUTE EITHER REMOVAL OF OVERBURDEN OR DISTURBANCE OF STRATA BY SURFACE OPERATIONS;

(i) THE LOCATION OF AREAS WHERE SUBSURFACE WATER WILL BE EXPOSED AT THE FACE-UP AREA;

(ii) THE LOGS OF DRILL HOLES SHOWING THE LITHOLOGIC CHARACTERISTICS OF THE STRATA TO BE DISTURBED BY SURFACE OPERATIONS OR REMOVED;

(iii) CHEMICAL ANALYSES OF EACH STRATUM OF OVERBURDEN TO BE REMOVED, INCLUDING THE STRATUM IMMEDIATELY BELOW THE LOWEST COAL SEAM TO BE MINED, AND OF EACH STRATUM TO BE DISTURBED BY SURFACE OPERATIONS TO IDENTIFY, AT A MINIMUM, THOSE HORIZONS WHICH CONTAIN POTENTIAL ACID-FORMING, TOXIC-FORMING, OR ALKALINITY-PRODUCING MATERIALS.

(2) THE GEOLOGY FOR THOSE SURFACE LANDS WITHIN THE PROPOSED MINE PLAN AREA WHICH ARE UNDERLAIN BY THE COAL SEAM TO BE EXTRACTED AND THE GEOLOGY OF THE COAL SEAM ITSELF, INCLUDING-

(i) LOCATION OF SUBSURFACE WATER, IF ENCOUNTERED;

(ii) THE DEPTH, CLASSIFICATION, AND GEOLOGIC STRUCTURE OF THE OVERBURDEN;

(iii) PYRITIC CONTENT AND POTENTIAL ALKALINITY OF THE STRATUM IMMEDIATELY ABOVE AND BELOW THE COAL SEAM TO BE MINED AND THE CLAY CONTENT OF THE STRATUM IMMEDIATELY BELOW THE COAL SEAM TO BE MINED; AND

(iv) PYRITE, MARCASITE, AND SULFUR CONTENT OF THE COAL SEAM.

(b) AN APPLICANT MAY REQUEST THAT THE REQUIREMENTS OF PARAGRAPH (a)(1) OF THIS SECTION BE WAIVED BY THE DIVISION. THE WAIVER MAY BE GRANTED ONLY IF THE DIVISION MAKES A WRITTEN DETERMINATION THAT THE STATEMENT REQUIRED IS

UNNECESSARY BECAUSE OTHER EQUIVALENT INFORMATION IS ACCESSIBLE TO IT IN A SATISFACTORY FORM.

RESPONSE:

STRATIGRAPHY

Within this section, the sedimentary rock units enclosing the Wattis, Third (Blind Canyon or Middle or A) and Hiawatha coal seams, and the seams themselves, are described.

Stratigraphic units which crop out within the boundaries of the PMC Permit Boundary include, in ascending order, the Upper Cretaceous Mancos Shale Formation, Star Point Sandstone, Blackhawk and Price River Formations, and the Upper Cretaceous-Paleocene North Horn Formation. A limestone unit is present near the tops of Gentry and Hoag Ridges, and is likely in the Paleocene Flagstaff Formation (Figure 3, Regional Stratigraphic Column).

Because of the complex nature of the stratigraphy in the mine plan area, the geologic information is considered to be confidential and is presented in the Confidential Volume of this application. Specific information may be obtained from DOGM management.

UMC 783.15 GROUND WATER INFORMATION

(a) THE APPLICATION SHALL CONTAIN A DESCRIPTION OF THE GROUND WATER HYDROLOGY FOR THE PROPOSED MINE PLAN AND ADJACENT AREA, INCLUDING, AT A MINIMUM-

(1) THE DEPTH BELOW THE SURFACE AND THE HORIZONTAL EXTENT OF THE WATER TABLE AND AQUIFERS;

(2) THE LITHOLOGY AND THICKNESS OF THE AQUIFERS;

(3) THE USES OF THE WATER IN THE AQUIFERS AND WATER TABLE; AND

(4) THE QUALITY OF SUBSURFACE WATER, IF ENCOUNTERED.

(b) THE APPLICATION SHALL CONTAIN ADDITIONAL INFORMATION WHICH DESCRIBES THE RECHARGE, STORAGE, AND DISCHARGE CHARACTERISTICS OF AQUIFERS AND THE QUALITY AND QUANTITY OF GROUND WATER, ACCORDING TO THE PARAMETERS AND IN THE DETAIL REQUIRED BY THE DIVISION.

RESPONSE:

Summarized in this section of the renewal application is a description of the ground water hydrology for the mine plan and adjacent area. A summary of pertinent geologic information is presented in response to UMC 783.14, including a description of structure and stratigraphic units. A description of the mine plan area aquifer systems is presented including a description of separate and distinct aquifer systems; lithology, extent, and thickness of aquifers; aquifer characteristics; hydrologic regimes; piezometric surface; ground water quality; hydrologic balance including aquifer recharge, storage and discharge characteristics; and uses and ownership of ground water.

MINE PLAN AND ADJACENT AREA AQUIFER SYSTEMS

Description of Aquifer Systems

Aquifer systems within the mine plan and adjacent areas exist under perched, water table, and confined conditions. Shales, siltstones, and mudstones present in the Blackhawk, Price River and North Horn Formations form a barrier to the downward movement of ground water, resulting in the formation of a saturated or perched zone where a more permeable layer is present above these less permeable units. These perched systems exist where sufficient recharge occurs to result in a saturated zone above a shale, mudstone, or siltstone unit. Such perched systems are substantiated by the occurrence of numerous springs high in the headwater regions of the watersheds (See Map 25, Inventoried Seeps and Springs and Surface Geology).

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Perched Aquifer Systems. The most significant perched aquifer system or systems occur near the ridgetop in the Price River and North Horn Formations where the flat ridgetop areas and local topographic catchment basins provide gently sloping areas of high snowpack accumulations which provide sufficient recharge for the perched aquifer systems to form. As indicated previously, this is substantiated by the occurrence of numerous springs in the headwaters regions within these two formations. Of the 201 springs illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, over 75 percent issue from the Price River and North Horn Formation.

As illustrated by the numerous springs identified in the Gentry Ridge area (see Map 25, Inventoried Seeps and Springs and Surface Geology), most of these springs (that do not appear to be fault related, either by flowrate or location), occur on the downdip side of ridges (the dip of the strata being to the south-southwest) particularly where the downdip edge of the strata is intercepted by a drainage-way. The contact point between a sandstone-shale interface of the North Horn Formation is shown along Gentry Ridge on Map 25, Inventoried Seeps and Springs and Surface Geology. As illustrated, several springs have been identified at this shale sandstone interface, all of which issue from the south and western side of Gentry Ridge in the downdip direction of the strata. The sandstone layer which serves as a perched aquifer system at that location in the formation appears to be laterally continuous along Gentry Ridge (Hunt 1985). Recharge from the flat ridgetop percolates downward until encountering the shale aquiclude. The ground water then follows the shale in the downdip direction through the overlying sandstone layer until it discharges at the ground surface on the downdip side of the ridge.

This perched aquifer system was also identified in exploratory hole 84-23-1 on Gentry Ridge (see Map 25, Inventoried Seeps and Springs and Surface Geology). From the log of the hole, strata were identified as being wet from a depth of 130 feet to 190 feet, the 190-foot depth corresponds to an elevation of approximately 9,638 feet above the sea level. This elevation correlates with the sandstone shale interface and

the occurrence of springs at this interface identified along Gentry Ridge. As illustrated by the presence of springs issuing from points lower in the stratigraphic column, other perched systems exist lower in the stratigraphic column depending upon the availability of recharge.

In addition to the mechanism for ground water movement described above, the second and more significant mechanism controlling ground water movement is fault related. As illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, most springs identified as having flows in excess of ten gpm lie directly along a fault, in close proximity to a fault, appear to fall in line with the projection of an identified fault or lie along a suspected fault or major north-south fracture system. All of these higher yielding springs are associated with the north-south extensional fault or joint system. No major producing springs have been identified along faults of the east-west compression fault system, further indicating the closed versus open nature of these two fault systems.

The location of a number of the larger yielding springs higher up in the headwaters region of the watershed indicates that these springs are likewise associated with the perched aquifer system and that although the respective faults are "open", the shale layers at the fault plane are not necessarily "open" at all locations along the fault plane. The occurrence of these fault related springs high in the watershed indicates that even at the fault plane the shale layers form a barrier to the vertical movement of percolating water down the fault. This is not always the case nor stated as an absolute condition along all faults or at all locations along a given fault. In certain instances, local stress conditions may have created tension fractures in the shales, actually pulling the shales apart and creating openings, which have not necessarily sealed with time, thereby allowing ground water to recharge the aquifer system at deeper depth.

contradicted to the early hearings

As will be substantiated by water quality data, this later condition has been identified to exist associated with the three Huntington City wells located at the junction of Wild Cattle and Gentry hollows (See Map 26,

Ground and Surface Water Quality Sampling Stations with Water Quality Data). These three wells are fault or fracture related associated with the extensional fault system. Water quality from these wells is similar to water quality of the perched systems in the Price River - North Horn formations. High sulphate concentrations characteristic of the Blackhawk Formation are not present in these wells, indicating that recharge for these wells is along the fault from the Price River - North Horn perched system which lies above the Blackhawk Formation.

The extent of each individual perched aquifer system defined by the presence of springs is difficult to clarify. This is especially true when considering the influence of structure such as faulting on the ground water system as will be subsequently discussed. Lithologic characteristics of the Price River and North Horn formations were discussed previously.

Perched aquifer systems within the Blackhawk Formation have also been encountered in shoestring channel sandstones overlying the coal seams mined. Maps, referenced in response to UMC 783.14, illustrate the location of channel sandstones and/or the Aberdeen Sandstone unit above the Hiawatha, Third, and Wattis coal seams. Recharge to these channel sandstones is apparently limited since once storage within the channel sandstone has been depleted, the inflow to the mine from the sandstone unit stops. Generally as the mine face advances and as each channel sandstone is approached, drippers from the roof increase. Then when a bolt hole is drilled into the channel sandstone along the roof, a higher inflow through the bolt hole will be encountered and will continue to flow for a short period of time until the sandstone is dewatered. The flow then generally drops to and remains at zero. Most of the water made to date in the mine has occurred from dewatering these perched sandstone channels.

Regional Aquifer System. The regional ground water aquifer system occurs at depths well below the major perched system of the Price River - North Horn formations described above. For example, the perched aquifer along Gentry Ridge was identified in exploratory hole 84-23-1 to be at an

elevation of 9,348 feet. Whereas in hole 83-26-1, water inflow was suspected at elevations 8,130 feet and the fluid level during logging of hole 84-26-3 was recorded at an elevation of 8,557 feet, some 1,000 feet below the perched system identified above. It is recognized that neither the elevations of suspected inflow in hole 83-26-1 nor the fluid level during logging of hole 84-26-3 reflect the stabilized piezometric surface of the regional aquifer. However, this information does document that the regional system exists at significantly deeper depths than the perched system of the Price River - North Horn Formations.

Depending on the location within the mine permit area, the regional aquifer system is expected to be encountered in the lower coal bearing interval of the Blackhawk Formation (or below), extending downward into the Spring Canyon Member of the Star Point Sandstone. West of the mine plan area this aquifer system is also expected to include the Storrs Sandstone member where the Mancos Shale tongue is absent between these two sandstone tongues. This aquifer system will be referred to herein as the Star Point-Blackhawk aquifer system. However, the Star Point Sandstone is the most significant member of this aquifer system due to the presence of siltstones and shales in the Blackhawk Formation which limit hydraulic communication vertically between the more laterally continuous units in the Blackhawk (i.e. the coal seams).

Data obtained from in-mine wells east of the Bear Canyon Graben indicated that the regional aquifer system within the mine plan area east of the graben lies within the Star Point Sandstone Formation. Three in-mine wells have been drilled downward from the Wattis, Third or Hiawatha Seams at the locations illustrated on Map 27, Piezometric Surface - Regional Aquifer System. Data obtained from these wells indicate that the regional water table is located in the Star Point Sandstone beneath the lowest coal seam to be mined.

Within the Gentry Ridge Horst area of the mine plan area, in between the Bear Canyon and Pleasant Valley Grabens, the regional aquifer system is expected to occur in the Blackhawk Formation. The dip of the strata is to the southwest with the coal seams of the Blackhawk extending (at

depth) beneath the locations at which the stream in Tie Fork Canyon becomes perennial. Therefore it is expected that beneath Gentry Ridge, especially toward the southern end of Gentry Ridge, water occurs both in and above the Star Point Sandstone with the saturated zone of the regional aquifer extending up into the Blackhawk Formation. The thickness of the saturated zone in the Blackhawk Formation beneath Gentry Ridge is not known at present, but the saturated thickness of the Blackhawk is expected to increase in the downdip direction toward the southern end of Gentry Ridge. Exploratory drill hole 86-26-4 (located toward the southern end of Gentry Ridge) will be completed during the 1986 drilling period and will be developed (if possible) into the lower Blackhawk and upper Star Point Sandstone Formations for the purpose of defining the piezometric surface of the regional aquifer system beneath Gentry Ridge.

Confined and artesian aquifer conditions were encountered in exploratory drill hole 85-35-1, drilled near the junction of Wild Cattle Hollow and Gentry Hollow in Tie Fork Canyon (see Map 25, Inventoried Seeps and Springs and Surface Geology). Flowing open fractures were encountered in this hole at a depth of 357 feet in a sandstone unit. After these fractures were intercepted, water under pressure within these fractures flowed to the surface and discharged from the top of the hole. The flowrate from the well was measured initially at approximately 35 gpm and has since stabilized at approximately 17 gpm; however, no piezometric head was determined. The hole was given to Huntington City to augment two other flowing wells drilled and completed earlier by the city approximately 300 feet west of the above referenced well. These two Huntington City wells are referred to as 86-35-3 and 86-35-2 on Map 25, Inventoried Seeps and Springs and Surface Geology. These two wells were drilled by a seismic company in the vicinity of several small springs at the approximate location where the eastern boundary fault of the Pleasant Valley Graben crosses Tie Fork Canyon. Therefore, these wells were possibly drilled in either the breccia zone of the eastern boundary fault of the graben, or slightly updip intercepting an open fracture zone in a sandstone unit. The depth to which these wells were drilled or at which the flowing water was encountered is unknown.

The sandstone unit in which the flowing fractures were encountered is the Spring Canyon Member of the Star Point Sandstone, which is laterally continuous across the mine plan area. The Spring Canyon Member is approximately 150 feet thick across the site.

Aquifer Characteristics

As documented in numerous publications, the primary permeability of rock formations exposed in the Gentry Ridge area is low. Aquifer test results reported by Lines (1985) in the Trail Mountain area of the Wasatch Plateau indicate transmissivities for the Star Point, Blackhawk, Price River, and North Horn Formations (except where fractured) to be less than 75 gallons per day per foot squared. As indicated by Lines (1985), these test results "are indicative of low permeability rock in most of the Cretaceous and Tertiary sections...." As also reported by Lines (1985), laboratory determinations of hydraulic conductivity on core samples obtained from the Blackhawk and Star Point Sandstone Formations indicated that hydraulic conductivity for sandstones of the Blackhawk Formation were on the order of 1.1×10^{-2} to 1.5×10^{-2} ft/day (3.9×10^{-6} to 5.3×10^{-6} cm/sec) and conductivities of the Star Point Sandstone were 1.5×10^{-2} to 3.1×10^{-2} ft/day (5.3×10^{-6} to 1.1×10^{-5} cm/sec).

Aquifer test results from tests conducted in the Blackhawk Formation both north and south of the mine permit area support the results presented by Lines. An aquifer test conducted by West Appa Coal Company in interbedded sandstones and shales of the Blackhawk Formation on East Mountain south of the permit area indicated a transmissivity on the order of 95 gallons per day per foot over a saturated interval of 192 feet (hydraulic conductivity of 6.6×10^{-2} ft/day or 2.3×10^{-5} cm/sec). Aquifer testing conducted by Coastal States Energy Company in the Blackhawk Formation in Eccles Canyon (approximately 11 miles north west of the mine permit area) indicated transmissivities to be less than 20 gallons per day per foot (see Coastal States Mine Permit Application for the Skyline Mine). The interval over which one of the Coastal States Energy Company's tests was conducted included the Aberdeen Sandstone, indicating the low primary permeability of channel sandstones within the Blackhawk Formation.

Lines (1985) also demonstrated that the shales of the Blackhawk Formation are essentially impermeable, reporting variations in hydraulic conductivity from 1.1×10^{-8} ft/day (3.9×10^{-12} cm/sec) to one of the shale samples tested which "was effectively impermeably to water even at a pressure of 5,000 lbs/in^2." Siltstones were reported by Lines (1984) to have hydraulic conductivities on the order of 7.8×10^{-10} to 6.4×10^{-12} cm/sec. Therefore, except where fractured and actually pulled apart by tension cracking, shales and siltstones in the formations effectively reduce and hinder the vertical movement of ground water within the Blackhawk and overlying formations. The impervious nature of the shales and siltstones results in the formation of perched aquifer systems in the Price River and overlying formations; as well as in that portion of the Blackhawk Formation above the regional water table and where sufficient potential for recharge exists to result in a perched system.

Sandstones of the upper Price River and North Horn Formations appear to be more porous and therefore better aquifers than the sandstones of the Blackhawk Formation. Sandstones of the Blackhawk Formation are less porous due to a higher percentage of silica cement found in the Blackhawk sandstones than is found in the sandstones of the upper Price River and North Horn Formations. Grain sizes are also larger in the sandstones of the upper Price River and North Horn Formations than in the sandstones of the Blackhawk.

As indicated by the low transmissivity figures presented above, the primary permeability within the Star Point Sandstone and overlying formations is quite small; however, the permeability of the sandstone units within these formations is enhanced by open joints and other fractures. This secondary permeability resulting from open fractures created along faults and joints provides the primary conduit system for ground water movement along the Wasatch Plateau. As indicated previously, the joint and fault systems striking in the easterly-westerly direction which were formed during the compressional event are closed, resulting in minimal water yield within the mines when these faults and joints are encountered. Whereas, the extensional joints and faults which strike in a north-south direction are generally open, and as

such increase the secondary permeability of the formations in the north-south direction.

As will be discussed subsequently in more detail, the open nature of these joints and faults and the attendant secondary permeability may be primarily limited to the sandstone units within these formations. Joints in the sandstone units do not "heal-over" as do joints in the mudstone units. This is suggested by the geometric relationship and the apparent ground water flowpath where north-south faults intersect the perched aquifer system. Typically, a shale or mudstone unit forms the base of the perched aquifer, forming an aquiclude and inhibiting the downward percolation of ground water, resulting in flow downdip along the top of the shale units. Where the shale aquiclude has been displaced by a north-south fault, the fault apparently acts as a barrier to ground water movement in the perched system inhibiting continued flow in the downdip direction. At many locations the fault is also apparently sealed at the shale aquiclude interface with the fault inhibiting the downward movement of ground water along the fault plane. Ground water then moves along the fault, which when intersected by a topographic depression in the ground surface forms a spring at the top of the shale aquiclude in line with the fault. If the faults were open everywhere at the shale interface with the fault, the perched system would drain down the fault along the fault plane into a deeper aquifer system and not discharge from the fault high in the watershed in the form of a spring. However, as indicated previously in some locations the faults may be open along short segments of the shale interface allowing discharge down the fault into a lower perched aquifer system or deeper regional system thereby recharging these lower aquifer systems. Springs were found at varying elevations along faults in the perched system of the upper Price River - North Horn Formations, indicating that the hydraulic flowpath along joints, fractures, and faults is extremely complex and only generalized statements as to the hydraulic conductance of ground water can be made for these perched aquifer systems. Also as previously indicated, recharge to the Star Point related Huntington City wells appears to be fault related with recharge from the perched system of the Price River - North Horn Formations.

Water movement within the open fractures formed along north south faults and joints has been documented both underground within the mines as well as from drilling which has intercepted these faults and fractures. U.S. Fuel Company intercepted the eastern boundary fault of the Bear Canyon Graben in the King IV Mine which has resulted in a sustained inflow to the mine on the order of 100 gpm. Exploratory drill hole W-12, which intercepted an interior fault of the Bear Canyon Graben, encountered an open fracture at a depth of approximately 1,200 feet. Although water was not encountered at this depth, water could be heard flowing inside of the hole. The depth to water inside the hole is unknown other than it was greater than 1,200 feet. A calcite crystal with terminations was retrieved from exploratory drill hole 83-14-1, from which an open fracture was inferred due to the presence of a calcite crystal having terminations. Water poured into hole CVR-5A (drilled in the interior of the Bear Canyon Graben) to facilitate logging the hole drained out of the hole through fractures as quickly as it was poured in. The total depth of this hole was 1,744 feet and the depth to the Wattis seam was 1,554 feet. The fluid level was finally intercepted at a depth of 1,512 feet and was presumably still falling at the time the hole was logged. Reference was previously made to the artesian condition encountered in exploratory hole 85-31-1, drilled near the junction of Wild Cattle Hollow and Gentry Hollow in Tie Fork Canyon (see Map 25, Inventoried Seeps and Springs and Surface Geology). Flowing open fractures were encountered in this hole at a depth of 357 feet in the Spring Canyon member of the Star Point Sandstone.

Secondary permeability within the grabens is expected to be greater than secondary permeability outside of the grabens. Based on resistivity tests and joint density counts in the Castlegate Sandstone conducted in the vicinity of the area referred to in Section 11 (T. 15 S., R. 7E.) as "The Steeps" and near the proposed graben crossing (see Map 27, Piezometric Surface - Regional Aquifer System), joint densities within the Bear Canyon Graben are approximately 50 percent greater than joint densities on either side of the graben.

Aquifer storage characteristics are discussed in a subsequent section of this section of the mine permit application.

Hydrologic Regimes

The increase in secondary permeability (primarily north-south) within stratigraphic units inside of the Bear Canyon Graben in comparison with secondary permeability within stratigraphic units outside of the graben, coupled with the boundaries (or hydrologic barriers) formed by the bounding faults of the graben would suggest that the hydrologic regime within the graben versus the hydrologic regime outside of the graben may be somewhat separate and distinct. Increased joint densities on the interior of the graben indicate a greater ground water transport capacity within the graben. The increased fracturing within the graben coupled with the inclined trough or topographic catchment basin formed by the graben, which in general have larger accumulations of snowpack, indicate recharge potential to the ground water system (primarily the perched aquifer system) is greater in the interior of the graben than outside of the graben.

Boundary faults as well as interior faults of the graben areas in general form physical hydrologic boundaries to the movement of ground water across these faults. These physical boundaries are formed both from displacement of the formations, in which a shale unit may be displaced vertically against a sandstone, as well as from a gouge zone of clay (0.1 to 2 feet thick) identified to have formed in the fault planes. Figure 7, Typical Section through an Idealized Version of a Fault, illustrates an idealized version of the fault zone as identified from excavation in the mine into the eastern boundary fault of the Bear Canyon Graben and from other excavations in cretaceous rocks of the Wasatch Plateau. As identified on the above referenced figure, the fault plane consists of a gouge zone of clay, referenced above, and highly fractured breccia zones on one but usually both sides of the gouge, ranging from 0.5 to 5 feet in thickness. Also as identified on the above referenced figure, joint densities increase near the fault plane, sometimes as part of the breccia zone but typically in addition to the breccia zone. Every fault examined to date has contained the gouge zone. However, some

faults did not have the associated breccia zones or areas of anomalous joint density. It has also been observed that the gouge and breccia zones increase in width somewhat proportional to the net slip along the fault plane (Hunt, 1985). Therefore, gouge zones (particularly along boundary faults of grabens which have large displacements) tend to form hydrologic barriers to the movements of ground water across the faults, thereby somewhat separating the geohydrology of the interior and exterior of the grabens.

There is sufficient evidence to suggest that faults do indeed contain or control the flow of ground water. Most faults of the extensional system encountered in the Star Point No. 2 Mine had accompanying inflows of ground water where the ground water was trapped against the gouge zone and conducted along the breccia zone of the fault. As will be discussed subsequently in more detail, there is a strong correlation between the location of large volume springs and identified faults. Also, as will be discussed in more detail in a subsequent section of this section of the mine permit application, the eastern boundary fault of the Bear Canyon Graben has been intercepted at two locations and drilled through at one of those locations within the mine. Upon penetrating 40 to 60 feet of gouge zone and fractured rock with the drill hole a significant ground water conduit on the interior side of the graben produced an inflow into the mine through the drill hole of 150 gpm for a short period of time. Flow from this drill hole dropped off rapidly with time, eventually dropping to zero.

Due to the potentially distinct hydrologic regimes, interior versus exterior of the graben, and since a mine access tunnel is proposed to be constructed through the Bear Canyon Graben to access coal reserves in the Gentry Ridge Horst, a separate discussion will be presented at appropriate sections in the report to discuss distinct hydrologic conditions inside of the graben area and potential impacts to the hydrologic regime from the graben crossing.

Piezometric Surface

The piezometric surface will first be discussed for the perched aquifer systems, followed by a discussion of the piezometric surface for the regional aquifer system.

Perched Aquifer System

The general direction of ground water movement in the perched aquifer system of the Price River - North Horn Formations is in the downdip direction. The dip of the strata in the horst between the Bear Canyon Graben and the Pleasant Valley Graben (Gentry Ridge) is to the southwest. The dip of the strata east of the Bear Canyon Graben is to the southeast. The dip of strata inside the Bear Canyon Graben has not been determined, but presumably is in a southerly direction.

As will be discussed in a subsequent section in more detail, most springs encountered during the inventory of springs (that do not appear to be fault related) occur on the downdip side of ridges, particularly where the downdip edge of the strata is intercepted by a drainage-way. Illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, few springs were found on the north (updip) side of the mine plan area. Most springs encountered in the Gentry Ridge area are located on the west or downdip side of the ridge.

As indicated previously, one of a number of perched systems in the Price River - North Horn Formations has been identified along Gentry Ridge. The contact point between a sandstone shale interface of the North Horn Formation is shown along Gentry Ridge on Map 25, Inventoried Seeps and Springs and Surface Geology. As illustrated, several springs have been identified at this shale sandstone interface, all of which issue from the south and western side of Gentry Ridge in the downdip direction of the strata. The sandstone layer which serves as the perched aquifer system at that location in the formation appears to be laterally continuous along Gentry Ridge (Hunt 1985). Recharge from the flat ridgetop percolates downward until encountering the shale aquiclude. The ground water then follows the shale in the downdip direction through the overly

ing sandstone layer until it discharges at the ground surface on the downdip side of the ridge.

This perched aquifer system was also identified in exploratory hole 84-23-1 on Gentry Ridge and in a recent exploratory drill hole (86-26-4) drilled in the summer of 1986 toward the southern end of Gentry Ridge and which has been developed into a hydrologic monitoring well (see Map 25, Inventoried Seeps and Springs and Surface Geology). From the log of hole 84-23-1, strata were identified as being wet from a depth of 130 feet to 190 feet, the 190-foot depth corresponds to an elevation of approximately 9,638 feet above sea level. This elevation correlates with the sandstone shale interface and the occurrence of springs at this interface identified on the above referenced map along Gentry Ridge. From the hydrologic monitoring well completed in the perched system at well 86-26-4, the water table of the upper perched system along Gentry Ridge has been identified at elevation 9,550 feet. The sandstone shale interface to the west and south emerges at the ground surface at an approximate elevation of 9,500 feet. As illustrated by the presence of springs issuing from points lower in the stratigraphic column, other perched systems exist lower in the stratigraphic column depending upon the availability of recharge.

The location where springs emerge on the downdip side of the ridge is affected by the location of fault and/or fracture systems. Where a shale aquiclude has been displaced by a fault, the fault apparently acts as barrier to continued movement of ground water in the downdip direction and serves as a conduit conveying the ground water along the fault until it discharges at the surface as a fault related spring or until it discharges down the fault into a lower perched aquifer system or to the regional system.

It would be nearly impossible to quantify the elevation of the piezometric surface for all of the localized perched aquifer systems which exist within or adjacent to the mine permit area. In addition to the numerous perched systems that exist, the numerous joints, fractures, and

faults make the flowpath within these perched aquifer systems extremely complex.

Regional Aquifer System

East of Bear Canyon Graben. Data obtained from in-mine monitoring wells indicate that within the mine plan area east of the Bear Canyon Graben the regional water table lies within the Star Point Sandstone. To date three ground water monitoring wells have been completed within the mine and two additional wells are proposed extending either from the Wattis Seam, the Third Seam, or the Hiawatha Seam downward into the Spring Canyon Member of the Star Point Sandstone. The location of these wells, the in-mine surface elevation of each well, and the elevation of the piezometric surface in each well are presented along with a piezometric contour map developed from these wells on Map 27, Piezometric Surface - Regional Aquifer System. As illustrated by the piezometric contour map, the direction of ground water movement in the regional aquifer system from the Star Point Ridge east of the Bear Canyon Graben is to the south-southeast (in the downdip direction) toward Miller Creek. Recharge to Miller Creek from the Star Point Sandstone was substantiated by a stream survey of the North Fork of the Right Fork (NFRF) of Miller Creek. This survey is presented in more detail in a subsequent section. According to this survey, on the date of the survey recharge to the North Fork of the Right Fork of Miller Creek from the regional aquifer located in the Star Point Sandstone was on the order of 62 gpm which represented approximately 50 percent of the total streamflow of the NFRF of Miller Creek.

As identified by the presence of a few springs issuing from the Star Point Sandstone on the north side of the mine plan area, a piezometric mound in the regional aquifer system probably exists beneath the Star Point Ridge with some ground water movement to the north. This ridge is probably located somewhere north of the topographic divide.

Within Bear Canyon Graben. The exact position of the piezometric surface of the regional aquifer system within the Bear Canyon Graben has not been determined. Within the Bear Canyon Graben the general direction of ground water movement south of the "The Steeps" along the north-south

fault system is expected to be south towards Huntington Creek. This conclusion is drawn from the fact that primary recharge occurs along the flat ridgetops and in topographic catchment basins with large accumulations of snowpack; and from the fact that from the "The Steeps" southward, the graben forms an inclined trough in which strata dip southward and topographic relief which creates drains for the ground water system is to the south.

Since mining will not take place within the graben and due to the potentially distinct hydrologic regimes inside of the graben versus outside of the graben (resulting from the boundary faults which serve as barriers to the movement of ground water across the faults), the position of the regional water table inside of the graben becomes critical primarily if it might be intercepted by the proposed tunnels which will be placed across the graben to access coal reserves beneath Gentry Ridge.

The proposed rock tunnel crossings through the Bear Canyon Graben to allow PMC to access their Southwest Tract of coal under Gentry Ridge extend from the eastern boundary fault in the NW 1/4 of Section 13, T.15.S., R7E. through the graben to the western boundary fault of the graben in Section 14 (See Map 27, Piezometric Surface -Regional Aquifer System. Only one of the two proposed tunnels illustrated on the above referenced map will actually be driven, probably the southern most tunnel. The proposed rock tunnel graben crossing will extend from the Wattis Coal Seam east of the graben (elevation 8,492 feet) to the Wattis Coal Seam west of the Bear Canyon Graben (elevation 8,450 feet) (See Figure 8, Bear Canyon Graben - A-A' Cross-Section). The proposed graben crossing is located in the upper Blackhawk Formation from 200 to 325 feet above the Wattis coal seam within the graben. Therefore the proposed rock tunnels are expected to traverse through the interbedded mudstones and sandstones of the upper Blackhawk (See Figure 8, Bear Canyon Graben - A-A' Cross-Section).

The proposed graben crossing appears to be located above the regional water table. While logging exploratory drill hole CVR-5A (drilled in the interior of the Bear Canyon Graben), water drained out of the hole

through fractures as quickly as it was poured in. The total depth of the hole was 1,744 feet (elevation 8,202 feet), the depth to the Wattis Seam was 1,554 feet (elevation 8,403 feet), and the elevation of the proposed tunnel along the cross-section at the position where the hole is projected onto the cross-section is 8,490 feet (See Figure 8, Bear Canyon Graben - A-A' Cross-Section). The fluid level was finally intercepted while logging the hole at a depth of 1,512 feet (elevation 8,445 feet), and was presumably still falling at the time the hole was logged. This falling fluid level was therefore some 44 feet below the proposed elevation of the graben crossing at hole CVR-5A. Actually, hole CVR-5A is located some 2,000 feet north of the proposed graben crossing. Since the ground water gradient within the graben is to the south, the ground water level at the graben crossing would be deeper than the 44-foot separation calculated between the elevation of the proposed tunnel and the fluid elevation measured in hole CVR-5A. This is also significant relative to intercepting perched water when the fracture system associated with this hole is intercepted by the rock tunnel. It would appear that this fracture system within the graben is sufficiently open that perched water will not be encountered at the elevation of the graben crossing as this fracture system is encountered.

Other exploratory boreholes in the vicinity of the graben crossing show a similar relationship between the fluid level in the hole during logging versus the elevation of the proposed tunnel of the graben crossing. Hole 83-14-3-C had a fluid level elevation of 8,315 feet; whereas the tunnel elevation is 8,456 feet. Hole CVR-7 had a fluid level elevation during logging of the hole of 8,315 feet; whereas the tunnel elevation at a location where CVR-7 would be projected onto the tunnel cross-section is 8,456 feet. Hole CVR-6 showed a reverse relationship with the fluid level elevation in the hole during logging of 8,741 feet versus a tunnel elevation of 8,461 feet. A loss of circulation of drilling fluid was not noted on the log for CVR-6 as was noted for the other holes referenced above. Therefore, water introduced into the hole for logging purposes would not drain out of CVR-6 as it did in the other holes that had apparently intercepted fractures in the formation.

In addition to the fluid level data in the exploratory drill holes, the behavior of inflows from the eastern boundary fault into the mine likewise indicates that the tunnel will not be located below the regional water table. According to a memorandum prepared by John Mercier of PMC (dated May 23, 1983), the eastern boundary fault of the Bear Canyon Graben has been reached at two underground sites in the Plateau Star Point Mines. According to information contained in the U. S. Fuel Company Hiawatha Mine Permit Application, the eastern boundary fault was also intercepted in the 10th West Section of the U.S. Fuel Company King IV Mine. The two encounters by PMC in the Star Point Mines were at the 2nd Left and 2nd West Mains sections (the proposed entrance to the rock tunnels of the graben crossing). The 2nd Left encounter is located approximately 5,300 feet north-northwest of the proposed crossing at 2nd West Mains. The elevation of 2nd Left is approximately 8,780 feet and the elevation of 2nd West Mains is approximately 8,490 feet (See Figure 8, Bear Canyon Graben - A-A' Cross-Section). The 10th West encounter by U.S. Fuel is located at an elevation of 8,180 feet approximately 6,600 feet south of the proposed graben crossing. According to Mr. Mercier:

> "The 2nd Left encounter initially experienced little water inflow (at 6 gpm) from roof strata on the face offset. Within three weeks, liquified gouge in the faces of entries #2 and #3 flowed approximately 10 to 15 feet into the entries. Underground drilling in the #1 entry penetrated 40 to 60 feet of gouge and fractured rock before tapping into a significant ground water conduit. Inflow peaked at about 150 gpm from drill holes before dropping to less than 10 gpm after 10 weeks (the flow dropped to 50 gpm in 2 weeks).
>
> "A second encounter with the east side of the graben (in the 2nd West Mains) experienced an initial inflow rate of about 20 gpm from the roof strata. This flow was reduced to less than 10 gpm after 4 weeks of exposure. Very little water has been found at the actual face offset."

Inflow from the drill hole which penetrated the fault at the 2nd Left encounter has since dropped to zero.

The above information indicates that at the proposed graben crossing, the rock tunnel would appear to be above the regional aquifer system and anticipated inflows into the mine will be derived from dewatering a limited perched aquifer system in the upper Blackhawk Formation, primarily fracture related. Identified by drill hole data inside the graben, the regional aquifer system apparently lies at an elevation below the proposed rock tunnel. Inflow to the mine at the proposed entry to the rock tunnel of the graben crossing at 2nd West Mains dropped rapidly from 20 gpm to 10 gpm in only four weeks, and since that time to zero, indicating the dewatering of a perched aquifer system. Inflow from the underground mine drill hole which penetrated some 400 feet into the graben from the 2nd Left encounter, likewise diminished from its peak of 150 gpm to 10 gpm in only 10 weeks (eventually to zero) indicating the dewatering of a perched system associated with fractures on the inside of the graben along the eastern boundary fault. If the proposed graben crossing were to be driven at an elevation below the regional water table, the drill holes inside of the Bear Canyon Graben would have identified fluid levels at elevations higher than the proposed tunnel and inflow to the mine at the 2nd West Mains and 2nd Left encounters would have been maintained at a sustained rate, not diminishing so drastically with time.

The opposite is true at the encounter with the eastern boundary fault of the Bear Canyon Graben by U. S. Fuel Company in the 10th West Section of the King IV Mine. As indicated in the U. S. Fuel Company Hiawatha Mine Permit Application, page VII-3 of Section 7.1, "large water flows have been encountered in the past, mainly due to contact with the Bear Canyon Fault, which is a major water bearing structure. Old mine workings have contacted the fault at several points and this probably accounts for most of the mine water presently being discharged from the Mohrland portal" (800 to 900 gpm).

Unlike flows encountered by PMC at the proposed graben crossing, inflows into U. S. Fuel Company's King IV Mine from contact with the eastern boundary fault of the graben have stabilized at fairly high inflow rates when compared with most mines of the area, indicating that the King IV Mine lies below the regional water table. The 10th West Main encountered the Bear Canyon Fault in the NE 1/4 of the SW 1/4 of Section 23, T.15 S., R.7E. at an elevation of about 8,180 feet. Ground water encountered at this location occurred on the east side of the fault, primarily from the floor through an area the size of a bushel basket. According to information contained in a November 7, 1983 U. S. Fuel "Response to Determination of Adequacy," on file at the DOGM, inflow into the mine at the 10th West Main intercept with the Bear Canyon Fault, was measured at 100 gpm. Personnel of U. S. Fuel Company have indicated that this inflow rate is fairly constant. The fault was not penetrated; therefore, water encountered in the mine is presumed to be bounded on the west by the gouge zone of the fault system and presumably receives recharge from areas east of the fault. Interception of the regional aquifer system at the 2nd West Mains and 2nd Left sections would have resulted in a sustained inflow into the mine as is presently occurring in the 10th West Main of U. S. Fuel's King IV Mine.

West of Bear Canyon Graben. The piezometric surface of the regional aquifer system within the Gentry Ridge Horst (west of the Bear Canyon Graben) has not been quantified. Toward the southern end of Gentry Ridge (the downdip end) the regional aquifer system is expected to be encountered in the lower coal bearing interval of the Blackhawk Formation and the Star Point Sandstone. Toward the northern end of Gentry Ridge (the updip end) the regional aquifer system may be encountered in the lower coal bearing interval of the Blackhawk Formation or similar to the east side of the Bear Canyon Graben, the regional water table may lie within the Star Point Sandstone.

A deep monitoring well has been completed in exploratory drill hole 86-26-6 toward the southern end of Gentry Ridge during the 1986 drilling season. This monitoring well will be used to identify the elevation of the regional water table and relative position of the water table to the

coal seams being mined. Additional in-mine monitoring wells may be installed downward from the coal seams being mined as entries are advanced beneath Gentry Ridge. These in-mine monitoring wells will be used to monitor the piezometric surface of the regional aquifer as mining proceeds.

Aquifer Water Quality

In accordance with the ground water monitoring plan of the original mine permit application, operational monitoring of the ground water system has included the collection of quarterly ground water samples (when accessible) since 1980 from designated representative springs and from within the mine. Representative springs included in the operational monitoring plan were Springs S7-1, S11-1. S17-2, S18-2, 748, 751, 753, and 982 (see Map 26, Ground and Surface Water Quality Sampling Stations with Water Qaulity Data). Prior to 1985 operational monitoring included only those springs designated above, which are all located north of the Gentry Ridge area. No springs located along Gentry Ridge were included in previous monitoring since mining beneath Gentry Ridge was not scheduled within the past five-year permit term. During 1985 some additional springs (considered to representative springs) along Gentry Ridge were added to the monitoring schedule and water quality samples were obtained.

Most springs encountered within or adjacent to the mine plan area issue from the perched aquifer system of the Price River - North Horn Formations. All springs included in the operational monitoring plan issue from this perched aquifer system. Therefore, water quality data obtained from monitoring the springs are indicative of the perched aquifer system of the Price - North Horn Formations. Whereas, water quality data from water quality samples obtained from the in-mine monitoring sites are indicative of ground water of the Blackhawk Formation.

PMC is in the process of developing a data base program and loading all water quality data collected in the past into this program for analysis. To date most ground water data have been loaded onto the computer and a

statistical summary of all data through 1985 for each spring (with the exception of S17-2) has been prepared and is presented in Table 4, Statistical Summary of Water Quality Data. Presented in these tables are the mean concentration, standard deviation, maximum and minimum, number of samples, and period of record for each constituent monitored. Presented in Table 5, Sampling Data for 1985, is a listing of water quality data collected during the 1985 sampling period for Springs 18-2 through 85-35-1 Tie Fork Well. A listing of data collected prior to 1985 is not contained herein since a concise summary for the data base program has not as yet been developed. At present the complete listing of data from the data base program is too bulky to include herein and has been submitted to the agency in the required annual summary reports.

Presented in Table 6, Summary of In-mine Sampling Data for 1985, is a listing of water quality data collected from drainage areas No. 4, No. 6, and No. 12 within the mine (see Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data). As illustrated on Map 28, In-Mine Flow Monitoring Sites and Tributary Areas, and discussed in a subsequent section of the report, in-mine drainage area No. 12 includes the long wall area within the Wattis Coal Seam in the mine which is the major water yielding area within the mine.

In addition to the water quality data summarized in the tables referenced above, cation-anion diagrams are illustrated on Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data, for water quality samples obtained from springs, from in-mine sampling sites, from surface water sampling sites, and from the Huntington City Wells located in Tie Fork Canyon at the junction of Gentry and Wild Cattle Hollows. Included with the cation-anion diagrams on the above referenced map are the associated total dissolved solids (TDS) concentrations and the flowrate. With the exception of the Huntington City wells (85-35-1, 86-35-2, and 86-35-3 for which some 1986 data are included) the cation-anion diagrams were prepared from 1985 data and provided an indication of both spatial and seasonal variation in water quality from the above indicated sources. Also presented on the above referenced map is a cation-anion diagram of the statistical mean of the

concentrations from springs in which data are available prior to 1985. As indicated by the cation-anion diagrams of waters issuing from springs, the perched aquifer system of the Price River - North Horn Formations are all similar, having the primary chemical constituents of calcium and bicarbonate. These principal chemical constituents are probably due to the solution of calcite in the sedimentary rocks of the Price River - North Horn Formations.

At certain locations in the perched aquifer system of the Price River - North Horn Formations, particularly along Gentry Ridge where the Flagstaff Limestone Formation is present, magnesium becomes a more dominant cation than at the other locations within the mine plan area. For example, Springs S11-1, 784, and 734 contain magnesium concentration in milliequivalence per liter which are almost equivalent to the calcium concentrations. This increase in magnesium concentrations at these particular springs is probably due to the solution of dolomite (present in most limestones) from limestone identified to be present in the North Horn and, of course, Flagstaff Limestone Formations. According to Hem (1970), most limestones contain moderate amounts of magnesium, and "water from dolomite at or below saturation should contain nearly equivalent concentrations of calcium and magnesium in terms of milli-equivalence per liter, because in the solution process, equal amounts of the two ions will be dissolved."

The concentration of total dissolved solids (TDS) in the perched aquifer system is low, generally less than 300 mg/l. As indicated by the statistical data summaries presented in Table 4, Statistical Summary of Water Quality Data, the mean concentration of TDS of monitored springs of the Price River - North Horn perched system over the period of record from 1979 to 1985 varied from a low mean concentration of 190 mg/l at Spring 982 to a high of 272 mg/l at Spring 734. Also as indicated in the above referenced tables by the maximum and minimum values and the standard deviations for TDS, the dissolved solids concentration for springs of the Price River - North Horn perched system are relatively constant. In general, TDS concentrations are higher in the fall period of the year than in the early summer which would indicate quicker more

localized recharge to springs from snowmelt, which is in contact with the aquifer for shorter periods of time than water discharged from the springs during the low flow fall period of the year.

The mean level of laboratory pH of monitored springs of the Price River - North Horn perched aquifer system varied from a low mean level of 7.1 at Spring S11-1 to a high mean level of 7.63 at Spring 734 (see the statistical summary tables referenced above). The minimum pH recorded at any of the springs was 6.6 at Spring S11-1 and the maximum pH recorded at any of the springs was 7.85 at Spring S18-2.

Total manganese concentrations varied from a minimum of below detection limits at all springs of the Price River - North Horn perched system to a maximum of 0.56 mg/l at Spring 753. Total iron concentrations likewise varied from below detection limits at all springs to a high of 2.3 mg/l at Spring 753.

As indicated by the cation-anion diagrams for samples obtained from in-mine monitoring sites (see Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data), ground water of the Blackhawk Formation is a mixed type with no single dominant cation or anion. In addition to having higher concentrations of calcium and bicarbonate than waters of the Price River - North Horn perched aquifer system, waters of the Blackhawk contain significant concentrations of magnesium and sulfate with the concentration of magnesium and sulfate often being either equal to or exceeding concentrations of their respective counterparts, calcium and bicarbonate. The increased sulfate concentrations characteristic of waters of the Blackhawk Formation are most likely the result of shales having a high sulfide concentration. According to Hem (1970), most shales and fine grained sediments when freshly raised above sea level are well supplied with sulfides. The natural processes of weathering bring about oxidation from the surface down to or below the water table and the sulfate produced is available for transport. Shales of the Blackhawk Formation are apparently rich in sulfides as are shales of the Mancos Shale tongues which separate the three tongues of the Star Point Sandstone.

Increased sulfate concentrations provide an excellent indicator as to major sources of surface streams or springs. For example, cation-anion diagrams for surface stream monitoring stations in Tie Fork Canyon for Gentry Hollow and Wild Cattle Hollow (Stations 34-2 and 34-1 respectively, see Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data), are similar to waters of the perched aquifer system of the Price River - North Horn Formations indicating minimal recharge to the monitoring points from ground water in the Blackhawk Formation. Whereas, surface waters in the Right Fork of the North Fork of Miller Creek (Station ST-1) are high in sulfate and magnesium concentrations indicating that much of the surface streamflow at the monitoring site is derived from recharge from the Blackhawk and Star Point aquifer system.

Ground water within the Star Point Sandstone east of the Bear Canyon Graben apparently contains high sulfate concentrations as evidenced by the cation-anion diagrams referenced above at the surface water monitoring station ST-1. As will be discussed in a subsequent section of this section of the mine permit application, significant recharge occurs to the Right Fork of the North Fork of Miller Creek through the reach of stream in which the geologic formation exposed at the surface is the Star Point Sandstone. Between the headwaters region of the perched aquifer system and stream monitoring station ST-1, sulfate concentrations increase significantly from those characteristic of the perched aquifer system to those characteristics of the influence of shales of the Blackhawk or Mancos Shale Formations. Due to the significant recharge through this reach of stream from the Star Point Sandstone, it would appear that ground water in the Star Point Sandstone at this location is affected by water percolating downward from the Blackhawk Formation or water in contact with the Mancos Shale tongues which divide the Star Point Sandstone into three tongues.

Cation-anion diagrams and total dissolved solids concentrations for three artesian Huntington City wells (85-35-1, 86-35-2, and 86-35-3 which apparently penetrated fracture systems associated with faults in the Star Point Sandstone), are similar to cation-anion diagrams and TDS

concentrations of the Price River - North Horn perched aquifer system. Sulfate concentrations are low and magnesium concentrations are only moderate, indicating that recharge to the fracture systems of the Star Point Sandstone associated with these wells is apparently from the perched aquifer system of the Price River - North Horn Formations via a vertical conduit or open fracture system probably along the breccia zone of the faults. Little to no recharge is derived from the Blackhawk Formation itself (the formation located between the perched system described above and the Star Point Sandstone). The artesian condition associated with the fractures encountered in the Star Point Sandstone at the three wells indicates that the fracture system associated with the fault system is not open everywhere along the fault. If the fault system were not closed upstream of the wells for a certain distance the pressure head creating the artesian flowing condition of these wells would not be present.

The concentration of total dissolved solids of ground water in the Blackhawk Formation is double to triple the TDS concentrations of the perched aquifer system of the Price River - North Horn Formations. As indicated by the TDS concentrations accompanying the cation-anion diagrams on Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data, TDS concentrations from the three water quality monitoring stations within the mine varied from a low of 606 mg/l at station 1st West North No. 6 to a high of 868 mg/l at Station 9th Left No. 12. Total dissolved solids concentration increased between the August and October sampling periods in the mine which accompanied a corresponding decrease in flowrate at each sampling site. Total dissolved solids concentrations of surface streamflow at monitoring station ST-1 reflects significant recharge from the Star Point Sandstone (as discussed previously) with quality characteristics similar to waters of the Blackhawk Formation, but more highly mineralized in the fall period of the year. TDS concentrations at ST-1 ranged from 645 mg/l in the early summer of 1985 to 1130 mg/l in September of 1985.

As indicated in Table 6, Summary of In-mine Sampling Data for 1985, pH levels varied from 6.9 at Station 9th Left No. 12 in October 15, 1985, to

8.0 at Stations 1st West North No. 6 and 9th Left No. 12 in August of 1985.

Total manganese varied in 1985 at the three in-mine sampling sites from less than 0.01 mg/l at Station 9th Left No. 12 to 0.03 mg/l in August of 1985 at Station 1st West North No. 6. Total iron concentrations were measured at less than 0.05 mg/l at Station 9th Left No. 12 to a high of 0.14 mg/l at Station 1st West North No. 6 and Station 1st West No. 4. These concentrations of total manganese and total iron are in the same approximate range as those identified previously in springs issuing from the Price River - North Horn perched aquifer system.

Hydrologic Balance - Aquifer Recharge, Storage, and Discharge Characteristics

Since providing a description of recharge and storage characteristics of the aquifer system within the mine permit area is dependent upon discharge characteristics of the aquifer system, discharge characteristics will be discussed first followed by recharge and then storage.

Aquifer Discharge Characteristics

Discharge from identified aquifer systems as previously described occurs as springs, as artesian wells, as direct seepage to streams, as seepage down fault planes from an upper perched aquifer system to either a perched aquifer system lower in the stratigraphic column or the regional aquifer system, and as discharge from mines to the surface.

Discharge from Springs. Springs and seeps were inventoried within and adjacent to the mine plan area to provide an index to geohydrologic conditions within the aquifer systems of the mine plan area. The inventory was conducted during June and July of 1986 during which time the mine plan and adjacent areas were traversed by foot, recording the locations of springs encountered in the field onto aerial photographs. The inventory of springs was conducted in the early summer period because of the timing of the permit submittal which would not allow for conducting the inventory in the fall or base flow period of the year. It is anticipated that many of the springs encountered are intermittent,

flowing in the early summer period of the year in response to snowmelt and that many of these springs and seeps will dry up during the later base flow period of the year. At each spring the location was documented, and the flowrate, air temperature, water temperature, pH, and specific conductance were measured and recorded. In addition, water quality samples for determination of major cations, anions, and TDS were obtained from all springs previously included in the operational monitoring schedule, from additional springs considered to be characteristic of the various aquifer systems, and from all other springs with flowrates in excess of 10 gpm.

The locations of all springs and seeps identified during the inventory are illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology. Also presented on this map are the flowrates measured at each spring as well as selected cation-anion water quality diagrams for representative springs. There is not sufficient space on this map to illustrate cation-anion diagrams for all springs that were sampled, therefore only diagrams for representative springs are presented. A listing of identified seeps and springs with accompanying field measurements and laboratory water quality data obtained for each spring is presented in Table 7, Field and Laboratory Water Quality Data from Representative Springs Obtained During The 1986 Inventory of Springs.

As illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, most springs within or adjacent to the mine plan area issue from the perched aquifer system of the Price River - North Horn Formation. Of the 201 springs (not including minor seeps) encountered during the inventory, 151 springs or 76 percent of all springs found issue from the Price River -North Horn Formation. An additional 25 springs were found which issue from the Castle Gate Sandstone Formation which in conjunction with springs of the Price River - North Horn Formations represents 88 percent of all springs inventoried. Ten springs were found which issue from the Blackhawk Formation, eight springs issue from the Star Point Sandstone Formation, and seven springs were found which issue from the Mancos Shale. Of the ten springs found issuing from the Blackhawk Formation, five were found in Pack Trail Canyon on the west

side of the permit area, three were found along or near the east boundary fault of the Pleasant Valley Graben in Wild Cattle Hollow near its junction with Gentry Hollow, one was found in Mud Water Canyon, and one was found in Seeley Canyon. None of the Blackhawk related springs are high yielding springs. Spring 530 had a flowrate of 11 gpm with all other Blackhawk springs having flowrates of 3 gpm or less.

Most springs issuing from the Mancos Shale are located relatively near the contact between the overlying Star Point Sandstone and the Mancos Shale. The two largest yielding springs (springs 102 and 103 in Seeley Canyon) of the seven springs which were found issuing from the Mancos Shale are definitely fault related. Although a fault has not been identified that would extend through the location of the other five Mancos Shale related springs, it is anticipated that these springs are also fault or fracture related, receiving recharge from the overlying Star Point Sandstone.

As illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, most springs identified as having flows in excess of 10 gpm lie directly along a fault, in close proximity to a fault, or appear to fall in line with the projection of an identified fault. Many of the faults are illustrated with dashed lines indicating that the exact location has not been verified in the field. Those springs which lie near the estimated location of the fault may indicate that either the illustrated fault line should be moved or an additional fault line should be shown which falls in line with the identified springs. However, some of these springs may simply be related to a major fracture system with no vertical or horizontal displacement. All higher yielding springs are expected to be either fault of fracture related. All of these higher yielding springs appear to be associated with the north-south extensional fault system. No major producing springs have been identified along faults of the east-west compression fault system, further indicating the open versus closed nature of these two fault system.

Most springs encountered during the inventory (that do not appear to be fault related, either by flowrate or location) occur on the downdip side

of the ridges (the dip of the strata being to the south-southwest except east of the Bear Canyon Graben where the dip is south-southeast) particularly where the downdip edge of the strata is intercepted by a drainage-way. As illustrated on Map 25, Inventoried Seeps and Springs and Surface Geology, very few springs were found on the north and updip side of the mine plan area. Those springs encountered on the northern side of the mine plan area are assumed to be related to the regional aquifer system of the Star Point Sandstone and underlying formations. Also as illustrated on the above referenced map, eight springs were found issuing at a sandstone-shale interface of the North Horn Formation along the south and western sides of Gentry Ridge, in the downdip direction of the strata. No springs were found at this interface on the eastern or updip edge of this interface, indicating that at least in the perched aquifer system the direction of ground water movement is primarily downdip, locally influenced by topography and fault and fracture systems.

Of the total water yield at the time of the inventory of springs, the most significant yield to the surface water system of Gentry and Wild Cattle hollows of Tie Fork Canyon occurs from the perched aquifer system of the Price River - North Horn Formation. Of the 51 springs found within the surface water drainage basin of Gentry Hollow, all 51 springs issue from the North Horn Formation. Total discharge from these springs was 418 gpm (0.93 cfs), which if it is assumed that all of this flow with no losses is conveyed to the junction of Gentry Hollow with Wild Cattle Hollow, represents 71 percent of the total 1.3 cfs streamflow in Gentry Hollow measured at the time of the inventory of springs. Of the 60 springs found within the surface water drainage basin of Wild Cattle Hollow, 57 of the springs issue from the Price River - North Horn Formations with only the three minor springs referenced previously issuing from the Blackhawk Formation near the junction of Wild Cattle Hollow with Gentry Hollow. Total discharge from these 60 springs was 393 gpm (0.88 cfs) which represents 86 percent of the total 1.02 cfs streamflow measured in Wild Cattle Hollow during the inventory of springs. If discharge from springs from both the west side of Wild Cattle Hollow and the east side of Gentry Hollow (areas which were not inventoried) were

added to the total flows indicated above, it is anticipated that the total discharge from springs of the perched aquifer system of the Price River - North Horn Formations would represent well in excess of 100 percent of the total measured streamflow at the basin outlet of Gentry and Wild Cattle Hollows.

Of the 36 springs issuing within the North Fork of the Right Fork (NFRF) of Miller Creek, 21 springs were found issuing from the Price River - North Horn Formation, 14 from the Castle Gate Sandstone, and one from the Star Point Sandstone. Total flow from these springs during the spring inventory was 99 gpm (0.22 cfs). This represented 86 percent of the 0.26 cfs flow at the basin outlet of the NFRF of Miller Creek. However, as will be demonstrated subsequently, from a stream inventory of the NFRF of Miller Creek, significant recharge from the ground water system occurs directly to the stream from the lower Blackhawk-Star Point regional aquifer system. Therefore, a significant loss of waters from the perched aquifer system above the Blackhawk Formation occurs primarily due to evapotranspiration.

Total annual yield from springs of the various aquifer systems is difficult to determine because of the limited data. However, as will be discussed in more detail in the section related to aquifer storage, discharge from the perched aquifer system of the Price River - North Horn Formations drops off significantly from early summer to late fall, reflecting the limited storage system behind each spring.

Discharge From Wells. Only five wells currently exist within or adjacent to the Plateau mine plan and adjacent area. Two of these wells, located in the vicinity of PMC's surface facilities (Section 10, T. 15 S., R. 8 E.) were completed by PMC in 1976 or 1977 for providing occasional water for dust suppression on roads near the mine. Both of these wells are located where the Mancos Shale is the surface geologic formation and are completed in geologic units located stratigraphically well below the aquifer systems described herein. Productivity of the wells is quite meager and as a result, neither well is presently used. Well 1 is 1,280

feet deep and is completed in the Emery Sandstone into the Bluegate Shale.

The other three wells (referred to previously) are the flowing wells owned by Huntington City which are located near the junction of Wild Cattle and Gentry Hollows. Of these three wells, referred to as 85-35-1, 86-35-2, and 86-35-3 (see Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data), 85-35-1 was an exploratory hole drilled by PMC and subsequently given to Huntington City upon encountering artesian flow.

Confined and artesian aquifer conditions were encountered in exploratory drill hole 85-35-1 when flowing open fractures were encountered at a depth of 357 feet in a sandstone unit. The sandstone unit in which the flowing fractures were encountered is the Spring Canyon Member of the Star Point Sandstone, which is laterally continuous across the mine plan area. After these fractures were intercepted water under pressure within these fracture flowed to the surface and discharged from the top of the hole. The flowrate from the well was originally measured at approximately 35 gpm and has since stabilized at 17 gpm, however, no piezometric head was determined. The hole was given to Huntington City to augment two other flowing wells completed earlier by the city approximately 300 feet west of the above referenced well. These two Huntington City wells are 86-35-3 and 86-35-2.

Huntington City wells 86-35-2 and 86-35-3 were drilled by a seismic company in the vicinity of several small springs at the approximate location where the eastern boundary fault of the Pleasant Valley Graben crosses Tie Fork Canyon. Therefore, these wells were possibly drilled in either the breccia zone of the eastern boundary fault of the graben, or slightly updip intercepting an open fracture zone in a sandstone unit. The depth to which these wells were drilled or at which the flowing water was encountered is unknown. Although, due to water quality similarities of these two wells to 85-35-1 presented previously, it is assumed that the flowing water is likewise derived from the Star Point Sandstone.

From information obtained from Castle Valley Special Service District, from the spring of 1982 when the two Huntington City wells were developed, to January 1985 and further substantiated by flowrates measured by PMC in 1986, the combined flowrate from these two wells has fluctuated only six gpm, from a low of 80 gpm to a high of 86 gpm.

Discharge as Direct Seepage to Stream. Discharge from the ground water system also occurs as direct seepage to surface stream channels. Surface stream channels incised deep enough to intercept the ground water system, locally affect the piezometric surface of the associated aquifer system, creating a drawdown in the piezometric surface and an outlet towards which the ground water moves.

In order to quantify direct seepage to streams within or adjacent to the mine plan area a stream survey must be conducted to determine gaining and losing reaches of the streams and the magnitude of the gain or loss between measuring points. Such a survey has been conducted on the North Fork of the Right Fork (NFRF) of Miller Creek, the results of which are presented on Map 29, Stream Survey - North Fork Right Fork Miller Creek. The stream survey was conducted on July 2, 1986.

As indicated on Map 29, Stream Survey - North Fork Right Fork Miller Creek, streamflow in the NFRF of Miller Creek began at Spring 491 (located in the bottom of the channel in the Castlegate Sandstone) and increased from eight gpm at Spring 491 to 115 gpm at measuring point M-15, located above the junction of the NFRF of Miller Creek with the major east-west oriented tributary in Sections 19 and 29, T.15S, R.8E. With the exception of the two reaches of stream located between measuring points M-8 and M-14, the stream would be classified as a gaining reach of stream.

Streamflow increased through the reach of stream traversing the Blackhawk Formation due to direct seepage to the stream from ground water by some 21 gpm. However, of the 15 gpm increase between measuring points M-6 and M-8 a substantial portion is presumed to be derived from the base of the Blackhawk Formation where the Hiawatha Coal Seam has been

displaced by a sandstone channel in this area, and from the Star Point Sandstone. As discussed previously, from wells constructed inside the mine downward into the Star Point Sandstone, on the east side of the Bear Canyon Graben, the regional water table has been identified to occur within the Spring Canyon Member of the Star Point Sandstone. The direction of ground water movement within the regional system from beneath "Star Point" is southeast toward Miller Creek (see Map 27, Piezometric Surface - Regional Aquifer System). Therefore, an increase in flow due to seepage from the ground water system was anticipated from the Spring Canyon Member of the Star Point Sandstone. Actual ground water seepage from the Blackhawk Formation to Miller Creek is estimated to be approximately 9 gpm with the other 12 gpm measured between MW-2 and M-8 being derived from inflow from the regional aquifer system of the Star Point Sandstone. Seepage from the Blackhawk Formation occurs primarily from perched aquifer systems associated with channel sandstones within the Blackhawk Formation.

The loss in Streamflow between measuring points M-9 and M-14 is due to flow from the stream into alluvial deposits which are present in the channel beginning below M-9. Upstream from M-9 the stream channel is incised to bedrock, the bedrock forming the channel bottom. Downstream of M-9 the canyon widens and a narrow band of alluvium is present along and beneath the channel throughout the remainder of the surveyed section. As the water in the stream channel leaves its bedrock base traversing the alluvial deposits, water is lost from the stream to the alluvium with interflow occurring in the alluvium.

The NFRF of Miller Creek experiences a substantial gain in stream flow through the Storrs and Panther members of the Star Point Sandstone, experiencing a 49 gpm gain between measuring points M-14 and M-15. This is not merely a resurfacing of ground water lost to the alluvium between M-10 and M-14 as evidenced by the water quality data previously presented and specific conductance values reported on Map 29, Stream Survey -North Fork Right Fork Miller Creek. Specific conductance at M-14 was measured at 592 micro-mhos per centimeter and had nearly doubled to 1,190 micro-mhos per centimeter at M-15, indicating a significant inflow of poorer

quality water. The cation-anion diagrams discussed in more detail in a previous section of this section of the mine permit applications indicate that between the headwaters region of the perched aquifer system and stream monitoring station ST-1 (M-15 in this survey), sulfate concentrations increase significantly from those characteristic of the Price River - North Horn perched aquifer system to those characteristic of the influence of shales of the Blackhawk or Mancos Shale Formations. Due to the significant recharge through this reach of stream from the Star Point Sandstone, it would appear that ground water in the Star Point Sandstone at this location is affected by water percolating downward from the Blackhawk Formation or water in contact with the Mancos Shale tongues which divide the Star Point Sandstone into three tongues.

Similar detailed stream surveys have not been conducted on other streams within and adjacent to the mine plan area. However, as indicated previously, surface water quality data obtained from streams in Gentry and Wild Cattle Hollows at their junction in Tie Fork Canyon indicate that waters in these streams are derived from either snowmelt runoff or ground water inflow from the perched aquifer system of the Price River - North Horn Formations. The low sulfate and magnesium concentrations indicate minimal inflow from ground water within the Blackhawk Formation. The comparison, discussed previously, of total spring discharge from the Price River - North Horn Formations (within the Wild Cattle Hollow and Gentry Hollow drainage basins) to the total stream discharge likewise indicated that the primary source of stream base flow to Wild Cattle and Gentry Hollows down to their junction is ground water discharge from the perched aquifer system of the Price River - North Horn Formations.

Seepage Down Fault Planes. Some ground water is discharged from upper perched aquifer systems to lower perched aquifer systems or to the regional aquifer system down the breccia zone of fault planes. It is difficult to impossible to identify exact locations where this might be occurring or to quantify the rate of seepage downward along a fault plane.

The significant number of fault related springs in the perched aquifer system of the Price River - North Horn Formations indicates that in many or most locations the faults are sealed vertically, inhibiting the downward movement of water along the fault plane. Typically, a shale of mudstone unit forms the base of the perched aquifer, forming an aquiclude and inhibiting the downward percolation of ground water, resulting in flow downdip along the top of the shale unit. Where the shale aquiclude has been displaced by a north-south fault, the fault apparently acts as a barrier to ground water movement in the perched system inhibiting continued flow in the downdip direction. The fault is also apparently sealed at the shale aquiclude interface with the fault inhibiting the downward movement of ground water along the fault plane. Ground water then moves along the fault, which when intersected by a topographic depression in the ground forms a spring at the top of the shale aquiclude adjacent to the fault. If the faults were open everywhere at the shale interface with the fault, the perched system would drain down the fault along the fault plane into a deeper aquifer system and not discharge from the fault high in the watershed in the form of a spring.

However, in some locations the faults may be open along short segments of the shale interface allowing discharge down the fault into a lower perched aquifer system or deeper regional system thereby recharging these lower aquifer system. Springs were found at varying elevations along faults in the perched system of the upper Price River - North Horn Formations, indicating that the hydraulic flowpath along joints, fractures, and faults is extremely complex and only generalized statements as to the hydraulic conductance of ground water can be made for these perched aquifer systems. Also as previously indicated, recharge to the Star Point related Huntington City wells appears to be fault related from the perched system of the Price River - North Horn Formations.

Mine Discharge. Ground water intercepted within the mine is either used within the mine for fire protection, dust suppression, or other mining operations; or ground water is discharged from the mine workings via several routes. Some excess ground water made within the mine is pumped

to surface operations facilities for culinary supplies, for coal washing, and to provide for surface dust control. Since the mine workings east of the Bear Canyon Graben lie above the regional water table (which has been identified to occur in the underlying Star Point Sandstone), some ground water (intercepted from the overlying perched channel sandstones) is probably discharged to the deeper regional system via percolation from the sump areas. Excess water not used in the mine or for other mining operations is discharged at the surface into Mud Water Canyon at the Mud Water Fan deck. An undetermined quantity of water is discharged at the fans into the atmosphere as water vapor in the air. Some water is also used from within the mine to supply culinary water needs for the bath house and office on the Lion Deck.

Two major sump areas are maintained in the mine into which all water made within the mine is directed and from which water is taken for the in-mine and surface operational uses listed above or for discharge at Mud Water Canyon. These two sumps are referred to as the "Mother Goose" sump (located in the "Main West" area of the Middle coal seam) and the "Father Goose" sump (located in the Wattis seam workings - see Map 28, In-Mine Flow Monitoring Sites and Tributary Areas). Flow meters are monitored at each of these sumps which measures water pumped from each sump for the various uses. Water pumped from the "Mother Goose" sump is used for coal washing and surface dust control, some water is pumped to 5th South in the mine for fire protection water, and the remaining water is either pumped to the Mud Water discharge point or pumped to the "Father Goose" sump or other mining sections for use in the mine. Water pumped from the "Father Goose" sump is used entirely for mining operations in the Wattis Seam.

Ground water made within the mine has been monitored at 16 measuring points within the mine since February of 1985. Water discharged at the Mud Water Fan and water used from within the mine for culinary purposes have also been monitored since February of 1985. Flowrates measured at the 16 in-mine monitoring points are instantaneous flowrates measured once during the month. Flows measured from the sumps and at the Mud Water discharge are monthly totals. The monthly totals and/or

instantaneous flowrates at the various monitoring sites within the mine are presented in Table 8, Plateau In-Mine Monitoring Flow Quantities (gpm). The in-mine drainage areas tributary to the monitoring sites are illustrated on Map 28, In-Mine Flow Monitoring Sites and Tributary Areas.

The total instantaneous flowrate from the 16 in-mine measuring points is an indication of the majority of flow made within the mine, but does not necessarily reflect the total flow made within the mine. As illustrated on Map 28, In-Mine Flow Monitoring Sites and Tributary Areas, certain areas within the mine workings are directly tributary to the two primary sump areas and an independent measurement of ground water made in these areas would be difficult to obtain. However, the sixteen measuring points do give an indication of the quantity of water made from different sections of the mine. For example, water made from the drainage area tributary to measuring point No. 12 (which is the drainage collection point for all water coming out of the long wall panels) varied from as low as 36 percent of the total flow near the completion of long wall panel No. 2, to as high as 76 percent of the total flow at the start of long wall panel No. 3. The diminishing flowrate from the long wall panels as the panel is progressively mined out is indicative of the perched system of the overlying channel sandstones being dewatered and is indicative that storage and recharge are minimal.

Caution must be exercised when analyzing the figures presented in Table 8, Plateau In-Mine Monitoring Flow Qauntities (gpm), and when comparing the instantaneous flowrates from the 16 in-mine measuring points with the totals discharged at Mud Water Canyon and the additional flows used in the mine from the two sump areas. An attempt has been made in establishing the in-mine measuring points and when computing the in-mine total flowrate to avoid "double-counting" of the water. However, it is difficult to totally isolate new inflows produced in the mine versus recycled water pumped from the sumps to be used for in-mine use. For example, the flowrate from the long wall area No. 12 had been diminishing since its peak in September of 1985 when long wall panel No. 3 was started. However, in March of 1986, the flowrate jumped from the

previous month's low of 65.8 gpm to 120 gpm. This increase in flowrate was not due to an increase in seepage into the mine from this area, but was due to recycled water being pumped more heavily from the sump areas for dust suppression in the long wall panel area.

From the figures presented in Table 8, Plateau In-Mine Monitoring Flow Quantities (gpm), the average annual flowrate from the 16 in-mine measuring points was approximately 150 gpm from April, 1985 to March, 1986. The average annual discharge from the mine over that same period at Mud Water Canyon was 129 gpm (66,611,600 gallons over the year). The average annual discharge from the mine to the surface facilities for coal washing and surface dust control was only 0.5 gpm (267,432 gallons). The average annual discharge for culinary use is approximately 4.4 gpm (2,289,000 gallons). Therefore, the total annual discharge from the mine to the surface was 134 gpm, excluding the undetermined flow that exits the mine as water vapor in the air.

Aquifer Recharge Characteristics

Recharge to the perched aquifer system of the Price River - North Horn Formations (the uppermost aquifer system within or adjacent to the mine plan area) is primarily from snowmelt along the flatter and more gently sloping ridgetops and local topographic catchment basins which contain high accumulations of snowpack. The normal annual precipitation for the higher elevation ridgetop areas, which expose the Price River, North Horn, and Flagstaff Limestone Formations is approximately 25 inches (Jeppson et.al, 1968). Of this annual 25 inches of precipitation, 16 to 20 inches occurs as normal October to April precipitation, indicating that the snowpack at these higher elevations commonly accumulates to depths of ten feet or more (Jeppson et.al, 1968). The minimal surface relief along the flatter ridgetops slows surface runoff and provides greater opportunity for infiltration of melting snow into the soils. Thus larger quantities of water percolate to deeper depths recharging the ground water system.

Recharge is limited from direct deep percolation to perched aquifer systems lower in the stratigraphic column (such as channel sandstones of

the Blackhawk Formation) or to the regional aquifer system due to the presence of shales or mudstone aquitards which form the perched aquifer systems. However, as indicated by fault related springs and/or artesian wells which issue at varying elevations within the perched aquifer system of the Price River - North Horn Formations or from the regional aquifer system of the Star Point Sandstone, some recharge to lower systems occurs downward along the fault planes, where faults even at the shale interface may be open for short segments allowing discharge down the faults.

Recharge to the fault systems probably occurs as a combination of direct seepage from snowmelt down the fault plane (where not inhibited by shale units) as well as formational ground water moving downdip along a sandstone shale interface in response to the drainage way created by the fault. Recharge from the formation occurs as ground water moves toward the fault through more permeable sandstone units and joints in these sandstone units. As indicated previously, a shale unit typically forms an aquiclude at the base of a sandstone unit, inhibiting the downward percolation of ground water, resulting in the formation of a perched aquifer system in the sandstone unit overlying the shale unit. At locations where a north-south fault intersects a perched aquifer system, ground water moves in the sandstone unit of the perched aquifer in the downdip direction the fault. The ground water then moves along the more fractured breccia zone of the fault, bounded by the clay gouge zone of the fault, until topographic relief provides an outlet for discharge of the ground water as a spring or until an open fracture at the shale interface with the fault is encountered which allows the ground water to move downward along the fault to a deeper aquifer system.

As indicated by the fault related springs, the majority of which issue from the perched aquifer system of the Price River - North Horn Formations, discharge down the fault from this perched aquifer system to the regional aquifer system is apparently limited. However, the varying elevations of springs do indicate that the hydraulic flowpath of ground water along joints, fractures, and faults is extremely complex and that the volume or rate of recharge down the fault is difficult to quantify.

And as discussed previously, water quality data obtained from the three Huntington City wells (which intercepted fracture systems of the Star Point Sandstone) indicated that recharge to the fault/fracture system into which these wells are completed is from the Price River - North Horn perched aquifer system which is conveyed to this lower system via the fault system. There is sufficient recharge to these flowing wells to maintain a relatively constant discharge to the two wells installed by Huntington City of 80 to 86 gpm and a discharge of 17 gpm to the third well drilled by PMC and given to Huntington City to augment their culinary water supply.

According to Price and Arnow, 1974 and the U. S. Geological Survey, 1979, the percentage of annual precipitation that recharges the ground water system along the Wasatch Plateau is probably less than five percent. An estimate of the percentage of the annual precipitation which recharges the ground water system was made for the only local tributary (Tie Fork Canyon) which drains the mine plan and adjacent area for which sufficient streamflow data are available to determine annual yield. Although a gaging station was maintained on the stream in Tie Fork Canyon for a three year period (1979 to 1981) only water year 1979 has a complete enough record to determine annual yield. Streamflow data for Tie Fork is presented in Exhibit 5, U.S. Geological Survey Data. From these data, the total volume of streamflow in 1979 in Tie Fork Canyon was 1,476 acre-feet. Monthly base flow from October to April varies from 27 acre-feet in October to 78 acre-feet in April. Monthly flow jumped during the snowmelt period of May and June to 591 acre-feet and 401 acre-feet, respectively, returning to more of a base flow condition in July of 111 acre-feet. Assuming the base flow condition in May and June to be equal to that of July, and that long- term recharge equals long-term ground water discharge, then the total annual yield from the ground water system to the surface stream flow was 706 acre-feet. Assuming the ground water tributary area to correspond with the drainage basin tributary area of 11.7 mi^{-2} (which for this area is probably low) then the depth of recharge to the ground water system would be 1.1 inches which is approximately four percent of the normal annual precipitation of 25 inches.

Aquifer Storage Characteristics. In general, small discharges and large seasonal variability of flows from springs of the perched aquifer system of the Price River - North Horn formations indicate that the storage volume of the perched aquifer system is small and limited. As indicated by flowrates accompanying the water quality diagrams on Map 26, Ground and Surface Water Quality Sampling Stations with Water Qaulity Data, and on Figure 9, Flow Hydrographs-Springs, flows from the springs increase significantly immediately following snowmelt in May and June of the year, but drop off rapidly toward the fall period of the year. For example, flows from Spring S7-1 decreased from 15 gpm in June of 1985 to 3.1 gpm in September of 1985. Springs S-17, S-18, 748, 751, and 753 showed similar responses, decreasing from 1.3 to 0.05 gpm, 5.8 to 0.9 gpm, 4.9 to 0.4 gpm, and 7.3 to 0.5 gpm respectively, between June and September of 1985.

Waddell et.al, (1983) indicated that the slope of the recession curve of the discharge of each spring provides a relative index of seasonal variability of discharge. With only two measurements obtained per year from springs monitored as part of the operational plan within the Plateau Mine plan area it is impossible to develop recession curves for springs. However, Waddell et.al, (1983) noted similar to the springs referenced above, springs at the higher altitudes within their study area within the Price River Basin (i.e. Beaver Creek, Mud Creek, and Soldier Creek drainage basins) have large seasonal variability of flow as indicated by steep flow recession curves. Waddell et.al. also noted a decrease in the variability of discharge from springs with decreasing elevation, which they attributed to an increase in the storage coefficient of the aquifer rather than a decrease in transmissivity. Spring 734, which issues from a lower elevation (9,050 ft) in the North Horn Formation than the springs referenced above (the minimum elevation of these springs being 9,400 ft at S17-2), and spring S11-1 which issues from the Castlegate Sandstone in Pack Trail Canyon demonstrate this condition of a decreased variability in flow with decreasing elevation. As presented on Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data, in 1985 flow from spring 734 dropped from 30 gpm in June to 20 gpm in September which is only a 33 percent decrease compared to an 80 to 100 percent

decrease at the six springs referenced above which are located at higher elevations in the North Horn Formation. In 1985, flow from spring S11-1 was constant at 0.4 gpm between June and September.

The storage capacity of the Star Point Sandstone (particularly fracture systems within the Star Point Sandstone) is fairly significant due to the extensive area covered by this sandstone unit. As discussed previously, flow from the two Huntington City wells (86-35-2 and 86-35-3) installed by Huntington City into a fracture system of the Star Point Sandstone in Tie Fork Canyon has fluctuated only six gpm from a low of 80 gpm to a high of 86 gpm. This fluctuation was monitored over the period from the spring of 1983 when the wells were installed to January of 1985.

Price and Arnow (1974) indicate that properly constructed wells in the Price and San Rafael river basins would have only limited yields (normally less than 50 gal/min). Wells immediately adjacent to PMC's mine plan area could normally be expected to yield less than 10 gal/min (Price and Waddell, 1973). Increased yields could be expected from wells penetrating highly fractured sandstones.

Rocks in the mountainous areas near PMC's mine area generally have low specific yields (0.2 to 0.7%) and low hydraulic conductivities (Price and Waddell, 1973). The volume of recoverable water in the area is small, averaging less than 600 acre-ft/mi2 in the upper 100 feet of saturated rock (Price and Arnow, 1974).

Lines (1985) reported laboratory determinations of core samples obtained from core samples of the Blackhawk and Star Point Sandstone Formations in the Trail Mountain area of the Wasatch Plateau. Porosity of sandstone samples varied from 11 to 17 percent in the Star Point Sandstone with the two sandstone samples of the Blackhawk Formation measured at 14 percent each. Shales and siltstones were on the order of two to four percent. Although no aquifer tests have been conducted that would allow accurate determinations of storage coefficient, Lines (1985) reported that other studies have found that specific yield ranges from 0.01 in shales to

about 0.1 in sandstones that are similar to those of the Blackhawk and Star Point Sandstone Formations of the Wasatch Plateau.

Where water in the Blackhawk or Star Point Sandstone is confined as in a sandstone layer between two shale layers, water released from storage is a result primarily of compression of the aquifer and expansion of the water as pressure in the aquifer declines. The storage coefficient provides a measure of the volume of water released from a confined aquifer with artesian head. Lohman (1972) indicates that the storage coefficient can be estimated from the rule of thumb relationship of 1×10^{-6} for each foot of thickness.

USES AND OWNERSHIP OF GROUND WATER

Ground water within and adjacent to the mine plan area is used by wildlife and for stockwatering, domestic, and industrial purposes. Ground water rights on file with the State Engineer's Office as of May, 1986 (which reflect legitimate man-made uses of the water) are listed in Table 9, Ground Water Rights Within and Adjacent to the Plateau Mining Company Mine Plan Area. The location of these rights is illustrated on Map 30, Ground Water Rights. Of water rights filed on various ground water sources, the primary use listed for the various rights is stock-watering. With the exception of one in-mine and one spring water right held by PMC all ground water rights from sources with origin in the Blackhawk or overlying formations are associated with springs. All uses for these springs are listed as stockwatering except for rights 91-103 and 91-104 held by U. S. Fuels which have a use listed as domestic. However, most if not all of these sources are also used by wildlife.

Of the 71 water rights listed in the above referenced table, seven of these rights list uses other than stockwatering, primarily for domestic purposes. Of these seven rights, with uses listed as domestic, PMC owns four rights, two rights (91-59 and 91-57) associated with springs in Sagebrush Canyon, one right (91-61) which is Spring S17-2, and one in-mine water right which is pumped to the surface to provide a domestic water supply for the office facilities. Of the remaining three water

rights, two of these rights (91-103 and 91-104) are owned by U.S. Fuel Company and are located in the headwater regions of the Middle Fork and the Left Fork of Miller Creek, outside of the area of potential impact from the Star Point Mines.

The last right (93-219) owned by the Huntington Cleveland Irrigation Company is connected to the "Tie Fork Springs." This right is a surface water right on Huntington Creek with an approved change number 7941 in point of diversion to two groups of "springs" located in Tie Fork Canyon. Actually, one group of springs are the three Huntington City Wells referred to previously in this Hydrology Section of the mine permit application. These springs and wells augment the culinary water supply for Huntington City.

UMC 783.16 SURFACE WATER INFORMATION

(a) SURFACE WATER INFORMATION SHALL BE DESCRIBED, INCLUDING THE NAME OF THE WATERSHED WHICH WILL RECEIVE WATER DISCHARGES, THE LOCATION OF ALL SURFACE WATER BODIES SUCH AS STREAMS, LAKES, PONDS, AND SPRINGS, THE LOCATIONS OF ANY WATER DISCHARGE INTO ANY SURFACE BODY OF WATER, AND DESCRIPTIONS OF SURFACE DRAINAGE SYSTEMS SUFFICIENT TO IDENTIFY, IN DETAIL, THE SEASONAL VARIATIONS IN WATER QUANTITY AND QUALITY WITHIN THE PROPOSED MINE PLAN AND ADJACENT AREAS.

(b) SURFACE WATER INFORMATION SHALL INCLUDE:

(1) MINIMUM, MAXIMUM, AND AVERAGE DISCHARGE CONDITIONS, WHICH IDENTIFY CRITICAL LOW FLOWS AND PEAK DISCHARGE RATES OF STREAMS SUFFICIENT TO IDENTIFY SEASONAL VARIATIONS; AND

(2) WATER QUALITY DATA TO IDENTIFY THE CHARACTERISTICS OF SURFACE WATERS IN, DISCHARGING INTO, OR WHICH WILL RECEIVE FLOWS OF SURFACE OR GROUND WATER FROM THE AFFECTED AREA WITHIN THE PROPOSED MINE PLAN AREA, SUFFICIENT TO IDENTIFY SEASONAL VARIATIONS, SHOWING-

(i) TOTAL DISSOLVED SOLIDS IN MILLIGRAMS PER LITER;

(ii) TOTAL SUSPENDED SOLIDS IN MILLIGRAMS PER LITER;

(iii) ACIDITY;

(iv) PH IN STANDARD UNITS;

(v) TOTAL AND DISSOLVED IRON IN MILLIGRAMS PER LITER;

(vi) TOTAL MANGANESE IN MILLIGRAMS PER LITER; AND

(vii) SUCH OTHER INFORMATION AS THE DIVISION DETERMINES IS RELEVANT.

RESPONSE:

PMC's mine plan area is situated near the headwaters of the Price and San Rafael river basins, with the Carbon-Emery county line marking the watershed divide (see Figure 1, Location Map. Approximately 3,900 acres drain to the north through Mud Water and Corner Canyons, tributaries to Gordon Creek of the Price River Basin; and through Miller Creek to the south and east of the mine plan area. Serviceberry and Miller Creeks join to form a tributary to the Price River. Drainage from the remaining area west of the divide flow toward the San Rafael River via Huntington Creek. Local perennial streams consist of Miller Creek, Huntington Creek and Tie Fork Canyon Creek. All other local streams are ephemeral.

Topography in the area is rugged, with elevations varying from 7,000 to 10,120 feet above sea level. Slopes within the mine plan area vary from more than 210 percent (65 degrees) to less than 4 percent (2 degrees) on Gentry Ridge. The dominant aspect (or principal direction of land surface slope) of PMC's mine plan area is to the north and south, with the exception of Gentry Ridge, which is to the east and west. The landscape is varied, with the lease area covered predominately by conifer, aspen, and juniper vegetative communities.

SURFACE WATER QUANTITY

Water sources located within PMC's mine plan area are predominately undeveloped streams and springs and seeps, and no major water bodies are located within or immediately adjacent to the mine plan area. The locations of surface water bodies found within the general vicinity of the Plateau mine permit area can be seen on Map 26, Ground and Surface Water Quality Sampling Stations with Water Quality Data. Discharges within the area are confined to one treatment facility, seven sedimentation ponds and one mine discharge located in Mud Water Canyon. The location of the Mud Water discharge can be seen on Map 31, Ground and Surface Water Monitoring Stations. A description of mine, treatment facility and sedimentation pond discharges is discussed in response to UMC 784.16.

Snowmelt is the primary source of water for the perennial streams in the two major drainage basins, with summer precipitation usually producing little runoff (U.S. Geological Survey, 1979). Ephemeral streams are also abundant in the Price and San Rafael river basins, existing primarily at lower elevations where evapotranspiration significantly exceeds precipitation.

Water use upstream from Castle Valley (the monoclinal valley containing most of the agricultural land noted in Figure 10, Price and San Rafael River Basins), is primarily for stockwatering and industrial purposes (coal mining and electrical power generation). Within Castle Valley, agriculture and power production utilize nearly all of the inflowing water (Mundorff, 1972), with minimum flows in the gaged streams and rivers in the two basins occasionally approaching zero. Storage reservoirs are common at higher elevations to the west of PMC's mine plan area and transbasin diversions occur throughout the area.

Mean Annual Water Yield

According to Jeppson et al, (1968), the mean annual water yield for PMC's mine plan area is approximately five inches. Two other hydrologic methods were used to determine the mean annual water yield to increase the confidence level of an estimate made by Jeppson. The first method of calculation, referred to as Grunsky's Rule, was originally developed by Grunsky (1908) and later adapted by Sellars (1965). In accordance with this method, the average annual water yield can be determined by

$$Q = aP^2 \quad (\text{for } P \leq 1/(2\ a)) \qquad (783.16\text{-}1)$$

$$Q = P - 1/(4\ a) \quad (\text{for } P \geq 1/(2\ a)) \qquad (783.16\text{-}2)$$

where:

Q = mean annual water yield, in inches;
P = normal annual precipitation, in inches, and;
a = runoff coefficient, in inches $^{-1}$.

Alpha (a) was determined from guidelines set forth by Hawkins (1976).

The second method of calculation is know as Ol'deKop's formula (Sellars 1965). According to this method, the mean annual water yield is determined from

$$Q = P - E_o \tanh \frac{P}{E_o} \qquad (783.16\text{-}3)$$

where Q and P are as previously defined and E_o is the annual potential evapotranspiration in inches.

According to Grunsky's Rule, the mean annual water yield from the mine plan area is 5.8 inches. According to Ol'deKop's formula (Sellars, 1965), the mean annual water yield from the mine plan area is 6.4 inches. These two methods utilize the information that mean annual precipitation and evapotranspiration over the mine plan area are 22 and 19 inches respectively (Jeppson et al., 1968). The estimates of the mean annual water yield from both Ol'deKop's and Grunsky's formulas compare reasonably well with the estimate reported in the Hydrologic Atlas of Utah prepared by Jeppson et al., (1968).

Seasonal Flow Variation

Seasonal streamflow variation for PMC's Mine Plan and Adjacent Area is identified through two sets of available USGS data. The most complete set of local data available is for Huntington Creek near Huntington, Utah. Monthly data for this station are available for the period from October of 1978 through September of 1981 (whereafter the station was discontinued), and has been plotted as shown on Figure 11, Monthly Flow Rates, Huntington Creek near Huntington, Utah.

Historically, flows in Huntington Creek (below the point of inflow from Deer Creek) have varied from a minimum of approximately 1 ft^3/s to a maximum of 2,120 ft^3/s (U.S. Geological Survey, 1970; and Utah Power and Light, 1979). The average flow rate for the three year period of record is approximately 85 cfs. Streamflows rise above the apparent base flow of approximately 20 cfs during the spring snowmelt period. The rapid rise in streamflow resulting from snowmelt typically occurs within the

three month period between April and June. Yearly variation in the rate and magnitude of the increase results from climatic conditions.

The second set of available data is for Tie Fork Canyon near Huntington, Utah as shown on Figure 12, Monthly Flow Rates, Tie Fork Canyon near Huntington, Utah. These data also span the period from October 1978 through September 1981 whereafter the station was discontinued. Data are also unavailable between the months of December and April for 1980 and 1981. Although less data are available for this station than the Huntington Creek Station, the general flow pattern indicated corresponds well with data available for Huntington Creek, thereby confirming a general seasonal variation pattern. Based upon measurements made at the United States Geological Survey station, the discharge in Tie Fork Canyon has varied from 0.17 ft^3/s to 29 ft^3/s. Exhibit 5, U.S. Geological Survey Data, contains the U.S. Geological Survey records for the Huntington Creek and Tie Fork Stations.

Additional streamflow data have also been collected as a result of the ongoing surface water monitoring plan initiated by PMC. Available flow records for each sampling location are shown on Figure 13, Flow Hydrographs. The locations of each surface station are shown on Map 31, Ground and Surface Water Monitoring Stations. Data tabulations are also given in Table 10, Surface Water Statistical Flow Summary, cfs (December, 1980 -September, 1985). Although year-round data are unavailable for these stations due to inaccessibility, many do contain enough data to confirm the presence of the general seasonal variation pattern previously illustrated for Huntington Creek and Tie Fork Canyon.

Peak Flow Recurrence Intervals

Estimates of peak flow recurrence intervals in the mine plan area were determined from techniques presented by Fields (1975). According to Fields, the 25 and 50-yr recurrence interval flood discharge of Utah streams is related to channel geometry characteristics. Specifically for PMC's mine plan area, the following relationships were found to apply:

$$q_{25} = 3.7\ W^{1.57} \qquad (783.16\text{-}4)$$

$$q_{50} = 3.9\ W^{1.58} \qquad (783.16\text{-}5)$$

where:

q_{25} = 25-yr recurrence interval flood discharges, in ft^3/s, and;
q_{50} = 50-yr recurrence interval flood discharges, in ft^3/s.
W = width of the channel bar cross section in feet;

The respective standard errors associated with the Equations 783.16-4 and 783.16-5 are 28% and 33%. The resulting flow frequency information is given in Table 11, Flood Frequency Discharge Estimates for Selected Streams on and Adjacent to the Plateau Mine Plan Area. Although the standard errors are relatively high for the prediction equations, the discharge estimates appear to be reasonable.

Surface Water Quality

In general, the regional chemical quality of water in the headwaters of the Price and San Rafael river basins is excellent, with these watersheds providing most of the domestic water needs to the people below. However, quality rapidly deteriorates downstream as streams cross shale formations (particularly the Mancos Shale in and adjacent to Castle Valley) and receive irrigation return flows from lands situated on Mancos-derived soils (Price and Waddell, 1973). Within the Price River Basin, for example, Mundorff (1972) reports that the Upper Price River and its tributaries north of PMC's permit area generally have a dissolved solids concentration of less than 400 mg/l and are of the calcium bicarbonate type. In lower Price River drainage areas above the confluence of the Price River with Miller Creek, most of the flows originate on or traverse Mancos Shale. Much of the lower flow is derived from irrigation return flows. The Price River at Wellington, which is near the center of the basin, has an average dissolved solids content of about 1,700 mg/l and is of a mixed chemical type (calcium-magnesium and sodium sulfate). At Woodside, which is about 22 miles upstream from the

confluence of the Price River with the Green River, the weighted average dissolved solids content has generally been between 2,000 and 5,000 mg/l, with the water type being strongly sodium sulfate. Similar deterioration patterns exist in the San Rafael River Basin.

Seven surface water monitoring sites within and adjacent to PMC's mine plan area have been selected as sampling sites for water quantity and quality monitoring. As mentioned previously, these stations include 5-1, 10-1, 20-1 (ST-2), 20-2 (ST-1), 34-1, 34-2, and 36-1 . As depicted on Map 17, Ground and Surface Water Quality Sampling Stations with Water Quality Data, surface waters of PMC's mine plan area are generally of the calcium bicarbonate type except in the northern and eastern portions of the mine plan area, where magnesium and sulfate concentrations are relatively high.

Water quality data have been obtained from the stations mentioned previously according to the water quality collection schedule presented and discussed in Section 784.14 and according to the laboratory methods used for sample analysis as presented in Exhibit 6, Laboratory Methods used for Sample Analysis. Of the parameters listed, TDS, TSS, pH, Acidity, Total and Dissolved Iron and Total Manganese are of particular interest as specified under the regulations. A water quality summary of available data through December of 1985 for each surface station has been prepared and is presented in Table 12, Surface Water Quality Data Summary. Water quality data for 1986 was not received in sufficient time to incorporate into the statistical analyses presented in this report, however, the data are presented along with 1985 data in Exhibit 7, 1985 and 1986 Water Quality Data, for agency review and reference. A more in-depth discussion of each of the above mentioned quality parameters, including seasonal variation is given below.

Total Dissolved Solids. The concentration of total dissolved solids (TDS) between the years 1980 and 1986 ranged from a low of 212 mg/l in Gentry Hollow (Station 34-2) to 4,531 mg/l in Mud Water Canyon (Station 5-1). The low measurement recorded was taken on April 28, 1981 and the high was recorded on April 21, 1983. The high recorded in 1983 occurred

DOESN'T MAKE SENSE

during a record snowfall year and is not considered characteristic of normal conditions which more reasonably are in the 1000 mg/l range. It was also noted that the higher TDS values also generally occur in lower stream reaches where the contribution due to Mancos Shale is significant.

During the months of April through June, when stream discharges are highest due to direct snowmelt, a diluting effect usually occurs resulting in lower total dissolved solids concentrations. Later in the year, as flows decrease and the majority of the flow is derived from ground water, this dilution effect becomes less pronounced and TDS concentration increase. The diluting effect mentioned is most pronounced at Stations 5-1, 20-1 (ST-2), 20-2 (ST-1), 34-1 and 34-2. Seasonal variations for each of the five stations mentioned above are shown in Figure 14, Seasonal Variation in TDS. As seen from the figures, winter TDS concentrations generally increased from 50 to 100 percent over springtime values.

Total Suspended Solids. Suspended solids concentrations during the inventory period were found to vary from <0.1 mg/l in Wild Cattle Hollow Creek to 2,682 mg/l at Station 10-1 in Sage Brush Canyon. As was the case with TDS, the high TSS value of 2,682 mg/l is not characteristic of the Sage Brush Canyon watershed where concentrations of TSS are generally below 600 mg/l. Mud Water and Sage Brush Canyons generally have higher TSS concentrations than the other local canyon streams.

Suspended solids concentrations tend to vary somewhat proportionately with flow rate. Increased suspended sediment are especially experienced during periods of snowmelt runoff or during thunderstorm events when streamflows are at a maximum. In keeping with this general principle, it is noted that the high concentration of 2,682 mg/l occurred in the early spring period, whereas the low value recorded as <0.1 mg/l occurred in a drier year after snowmelt runoff had occurred.

Information presented in Figure 15, Seasonal Variation in TSS, shows that early spring to early summer snowmelt naturally increases TSS

stream concentrations. The sporadic nature of TSS values during normally low flow periods seems to indicate the occurrence of a local rainfall event. The general relationship of TSS concentration and flow rate is shown on Figure 16, Flow vs. TSS. These three stations were chosen for graphical presentation because they contain more complete data sets than available for stations 5-1, 10-1, 20-1 (ST-2), or 36-1.

Hydrogen Ion - pH. The hydrogen ion activity (pH) was found to be relatively constant throughout PMC's mine plan area, varying from 6.9 to 8.5. The slightly basic condition of the surface water is due primarily to the high concentrations of bicarbonates (American Public Health Association et al., 1976). River water with values of pH in the range of those measured throughout the mine plan area are generally not influenced by pollution (Hem, 1970).

Seasonal variations in pH consistently indicate that naturally occurring increases occur in the early spring period when surface runoff is highest. In the early spring, pH values for Stations 5-1, 10-1, 2002, 3401, 34-2 and 36-1 ranged from, 8.0 to 8.5 as shown on Figure 17, Seasonal Variation in pH. Low pH values generally occur during late fall and were noted to range approximately between 7.1 and 8.0.

Acidity. Acidity data for all seven surface stations indicates some fluctuation in concentration during the 1980 through 1981 time period. The maximum concentrations reached for Station 20-2 (ST-1) in the North Fork of the Right Fork of Miller Creek and for station 36-1 located in Corner Canyon during 1980 were 24.0 and 28.0 mg/l respectively. The only other station sampled in 1980 was for station 34-1 located in Wild Cattle Hollow which reported a value of less than 0.1 mg/l in December. In 1981, all samples recorded were less than 12.0 mg/l. Since 1982, all stations reported acidity levels less than 0.1 mg/l.

The long term trend shows a sharp decline in acidity between 1980 and 1982 after which no trend is indicated. The reason for the drop is uncertain since all stations recorded the decrease instead of only those which would be mine imparted. No seasonal variations are identifiable

because of the samples since 1982 are all below a detection limit of 0.1 mg/l.

Total and Dissolved Iron. Data gathered between 1979 and 1985 indicate that both total and dissolved iron concentrations tend to be relatively constant from year to year throughout the area. The cementing agents of the Blackhawk Formation are expected to be the major source of iron in the surface waters of the mine plan area. In the vicinity of Scofield Reservoir (located approximately 18 miles north-northwest of the mine plan area), it has been determined that total iron concentrations are directly related to flow rate, resulting from the probable association of iron with sediments (Vaughn Hansen Associates, 1979). As a result of the outcroppings of the Blackhawk Formation throughout much of the central and western portions of the area, total iron concentrations generally increase during high-flow periods and decrease during low-flow periods. Correspondingly slightly higher spring and summer values for total iron were noted for station 20-2 (ST-1) in the Right Fork of the North Fork of Miller Creek and for station 34-2 located in Gentry Hollow as shown on Figure 18, Seasonal Variation in Total Iron. Total and dissolved iron concentrations varied through the mine plan area from 0.039 to 0.63 mg/l and from 0.001 to 0.065 mg/l respectively.

Manganese. Total manganese concentrations are low within and adjacent to the mine plan area, varying during the inventory period from less than 0.001 mg/l in the Left Fork of the North Fork of Miller Creek (Station 34-2) to 0.091 mg/l in Corner Canyon (Station 36-1). No trends in seasonal variation were noted.

Surface Water Classification

The Utah Division of Health has classified the water within PMC's mine plan area as 1C (protected for domestic purposes with prior treatment by standard complete treatment processes), 3A (protected for cold-water species of game fish and other cold-water aquatic life), 3C (protected for non-game fish and other aquatic life), and 4 (protected for agricultural uses including irrigation of crops and stockwatering). In general, the North Fork of Miller Creek (not the Right Fork of the North

Fork), Gentry Hollow and Wild Cattle Hollow appear to have the highest water quality with the greatest potential for use as a 1C domestic water supply. Corner Canyon and Sage Brush Canyon may have potential domestic supply use, but high TDS values and the fact that they are both ephemeral streams severely reduces their potential. Water used under classification 3 appears reasonable at all sites whereas agricultural use is somewhat limited due mainly to TDS considerations. Table 13, Utah Division of Health Numerical Standards for Water contains the numerical water quality standards applicable to these various classifications. Stations 20-1 (ST-2), 34-1, and 34-2 had no TDS exceedences above the 1,200 mg/l limit, whereas the remaining stations experienced at least one TDS limit exceedence.

During the baseline study, the chemical standards associated with the Utah Division of Health Numerical Standards were rarely exceeded. Most of the chemical standards in the table are for dissolved rather than total constituents, while most of the various water quality parameters determined during the baseline period were analyzed for the total rather than the dissolved form of the constituents.

Phosphates. Phosphates were analyzed in either the ortho form (a portion of total phosphate) or the total form. Approximately 50 percent of the samples analyzed for orthophosphate exceeded a limit for both recreation and aesthetics (2A and 2B), and for aquatic wildlife (3A and 3B) of 0.05 mg/l during the period of record. Total phosphate concentrations ranged from 0.03 to 5.9 mg/l as P. The appearance of phosphorous in the surface water of the mine plan area can be attributed to two sources, 1) the degradation of animal wastes from grazing in the area, and 2) phosphates derived from the phosphorous content of the soils (McElroy et al., 1976).

Phenol. Of the four monitoring stations analyzed for phenol, the concentration of phenol in Mud Water Canyon (0.032 mg/l at Station 5-1) exceeded the state standard for aquatic wildlife of 0.01 mg/l and three other stations had phenol concentrations matching the standard. The reason for the appearance of phenolic compounds in PMC's mine plan area is not precisely known since phenol is normally considered an indicator

of waste products. However, the U. S. Environmental Protection Agency (1975) indicates that phenolic compounds also arise from naturally occurring organic sources. The breakdown of organic residue in the area (both plant and animal) may be the source of the background phenol.

The concentrations of other constituents sampled at stations throughout the area are generally well below the state standards. In many instances, trace metal concentrations are consistently below the level of detection of routine laboratory techniques (particularly arsenic, cadmium, chromium, lead, mercury, and silver).

Surface Water Uses and Water Rights

The great majority of surface water located in the vicinity of PMC's mine permit area has been developed or used for stockwatering purposes. Local development has usually taken the form of watering troughs in conjunction with spring development. Surface water rights in and adjacent to the PMC's mine plan area on file with the Utah Division of Water Rights as of June, 1986 are listed on Table 14, Surface Water Rights, and shown on Map 33, Surface Water Rights Location Map.

Flow quantities are shown on the above mentioned tables only when they are specifically identified in the water right. In most cases water right volumes are attached to several diversion points (other water rights) thereby serving better its use as a stockwatering right. The above mentioned table does not attempt to identify the complex nature of such inter-related water rights.

As can be seen from the above mentioned map and table, all but one water right was issued for stockwatering purposes. Right number 92-174 located on the Right Fork of Miller Creek is owned by U.S. Fuel Company and is reserved for industrial purposes. For information related to mining impact upon and protection of these rights, the reader is referred to Section 784.14.

UMC 783.17 ALTERNATIVE WATER SUPPLY INFORMATION

THE APPLICATION SHALL IDENTIFY THE EXTENT TO WHICH THE PROPOSED UNDERGROUND COAL MINING ACTIVITIES MAY PROXIMATELY RESULT IN CONTAMINATION, DIMINUTION, OR INTERRUPTION OF AN UNDERGROUND OR SURFACE SOURCE OF WATER WITHIN THE PROPOSED MINE PLAN OR ADJACENT AREA FOR DOMESTIC, AGRICULTURAL, INDUSTRIAL, OR OTHER LEGITIMATE USE. IF CONTAMINATION, DIMINUTION, OR INTERRUPTION MAY RESULT, THEN THE DESCRIPTION SHALL IDENTIFY THE ALTERNATIVE SOURCES OF WATER SUPPLY THAT COULD BE DEVELOPED TO REPLACE THE EXISTING SOURCES.

RESPONSE:

The extent to which the proposed underground coal mining activities may proximately result in contamination, diminution, or interruption of an underground or surface source of water within the proposed mine plan or adjacent area is presented in Section 783.14(c). Measures to be taken to avoid or lessen the degree of impacts to surface and ground water sources and uses are presented in Section 784.14(a).

Alternative water sources to be considered by (PMC) should impact occur to surface or ground water sources, are as follows.

1. Development of an adjacent or nearby spring to increase its surface flow as replacement water.

2. Construction and placement of a "guzzler" near an impacted spring, which is a device that has been effectively used on an experimental basis in the past at PMC for collecting and storing precipitation for use by wildlife and livestock, and which is widely recognized and used for wildlife use, and stock use.

3. Placement of an impacted water right by either transferring one of PMC's existing water rights or by purchasing the impacted right from the impacted party, or by purchasing an additional right in the area as replacement water for the impacted right.

4. Drilling and equipping a well in the near vicinity to the impacted right but outside the influence of the mine. This may be feasible inside of the Bear Canyon and Pleasant Valley Grabens, which as discussed in Section 783.15 appear to be hydraulically separated from areas outside of the grabens by the less permeable gouge zones associated with the major boundary faults of the grabens.

5. Development of an alternate discharge point from the mine, at which point water made within the mine would be discharged as replacement water for an impacted source.

6. The purchase of surface stream rights and construction of a treatment facility capable of treating water for a domestic or culinary supply.

Should a water source be impacted, PMC will examine the position of the water source that has been impacted and determine which of the above alternatives or combination of alternatives could be most cost-effectively implemented to mitigate the impact that has occurred.

UMC 783.18 CLIMATOLOGICAL INFORMATION

(a) WHEN REQUESTED BY THE DIVISION, THE APPLICATION SHALL CONTAIN A STATEMENT OF THE CLIMATOLOGICAL FACTORS THAT ARE REPRESENTATIVE OF THE PROPOSED MINE PLAN AREA, INCLUDING-

(1) THE AVERAGE SEASONAL PRECIPITATION;

(2) THE AVERAGE DIRECTION AND VELOCITY OF PREVAILING WINDS; AND

(3) SEASONAL TEMPERATURE RANGES.

(b) THE DIVISION MAY REQUEST SUCH ADDITIONAL DATA AS DEEMED NECESSARY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THIS SUBCHAPTER.

4. Drilling and equipping a well in the near vicinity to the impacted right but outside the influence of the mine. This may be feasible inside of the Bear Canyon and Pleasant Valley Grabens, which as discussed in Section 783.15 appear to be hydraulically separated from areas outside of the grabens by the less permeable gouge zones associated with the major boundary faults of the grabens.

5. Development of an alternate discharge point from the mine, at which point water made within the mine would be discharged as replacement water for an impacted source.

6. The purchase of surface stream rights and construction of a treatment facility capable of treating water for a domestic or culinary supply.

If subsidence in Section 18, T15S, R8E, causes material damage to spring flows or quality, springs in the vicinity may be developed to increase their flow to replace water lost or guzzlers may be installed to provide water for wildlife and cattle. These springs include No.'s 236, 237, 491, 492, 501 and 502.

Should a water source be impacted, PMC will examine the position of the water source that has been impacted and determine which of the above alternatives or combination of alternatives could be most cost-effectively implemented to mitigate the impact that has occurred.

UMC 783.18 CLIMATOLOGICAL INFORMATION

(a) WHEN REQUESTED BY THE DIVISION, THE APPLICATION SHALL CONTAIN A STATEMENT OF THE CLIMATOLOGICAL FACTORS THAT ARE REPRESENTATIVE OF THE PROPOSED MINE PLAN AREA, INCLUDING-

(1) THE AVERAGE SEASONAL PRECIPITATION;

(2) THE AVERAGE DIRECTION AND VELOCITY OF PREVAILING WINDS; AND

(3) SEASONAL TEMPERATURE RANGES.

(b) THE DIVISION MAY REQUEST SUCH ADDITIONAL DATA AS DEEMED NECESSARY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THIS SUBCHAPTER.

RESPONSE:

The climate of the Star Point Mines area is typical of subalpine and cold desert areas in the central region of Utah. In general, the summer season is short with maximum temperature readings (degrees F) in the 80's and minimum readings in the 40's. Fall and spring seasons are erratic in nature with snow precipitation occurring as early as September and as late as the first part of June. Major snowfalls occur in the months of December, January, and February. Snow frequently remains on the ground from November until April in depths varying up to 2 ft. Winds are generally light to moderate with average speeds below 20 mph. The prevailing wind direction within the general area of the mine site is from the southwest. Winds are generally parallel to the canyons except during storm periods. Wind speeds vary from canyon to canyon.

Precipitation

Precipitation varies greatly in the vicinity of the Star Point Mines due to the Wasatch Plateau. Local factors affecting precipitation in the lease area are altitude, topography, and geographic location relative to the west-to-east storm track. The normal annual precipitation common to the western portion of the permit area is approximately 8 inches to 10 inches greater than it is near the offices and surface facilities areas.

The nearest weather monitoring station is at Hiawatha, located about 5 miles southeast from the center of the permit area. The annual precipitation recorded at Hiawatha station is 13.18 inches. Approximately 73% of the average annual precipitation is received as snowfall between October and April. The 27% occurs from May to September as rainfall.

Temperature

Temperature is seasonally variable and highly influenced by elevation. January temperatures may vary from a mean minimum of approximately 13 degrees F to a mean maximum of approximately 30 degrees F. July temperatures vary from a mean minimum of 54 degrees F to a mean maximum of 82 degrees F (Jeppsen et al., 1968). At the Hiawatha station, the average annual temperature is 45 degrees F. July is the warmest month

(average 69 degrees F) and January, the coldest (average 23 degrees F). Wide daily temperature ranges are caused by relatively strong daytime warming and rapid nighttime cooling.

Wind Direction and Velocity

Wind speeds on a regional basis can best be described as being light to moderate with average speeds below 20 mph. Wind speed varies from canyon to canyon. At the Lion Deck Portal area, the average wind speed is estimated at 10 mph, directed from west-southwest.

UMC 783.19 VEGETATION INFORMATION

(a) UNLESS SPECIFICALLY EXEMPTED BY THE DIVISION, THE PERMIT APPLICATION SHALL CONTAIN A MAP THAT DELINEATES EXISTING VEGETATION TYPES AND A DESCRIPTION OF THE PLANT COMMUNITIES WITHIN THE AREA AFFECTED BY SURFACE OPERATIONS AND FACILITIES AND WITHIN ANY PROPOSED REFERENCE AREA. THIS DESCRIPTION SHALL INCLUDE INFORMATION ADEQUATE TO PREDICT THE POTENTIAL FOR REESTABLISHING VEGETATION.

(b) A MAP OR AERIAL PHOTOGRAPH SHALL INCLUDE THE BOUNDARIES OF THE PERMIT AREA, THE LEGAL DESCRIPTION OF THE PERMIT AREA, AND SUFFICIENT ADJACENT AREAS AS REQUIRED BY THE DIVISION TO ALLOW EVALUATION OF VEGETATION AS IMPORTANT HABITAT FOR FISH AND WILDLIFE FOR THOSE SPECIES OF FISH AND WILDLIFE IDENTIFIED UNDER UMC 783.20.

RESPONSE:

Included in the present permit application is a map entitled, "Permit Area Vegetation" (Map 33) on a scale of 1:12,000 showing the current boundaries of the current permit area and the boundaries of all existing vegetation types within and immediately adjacent to the permit area. Table 15, Permit Area Vegetation Acreages contains a breakdown of the extent of each vegetation community with the permit area.

Also included in this application area 1:4800 scale maps outlining all areas that have been disturbed by prior mining activities or which are

proposed to be disturbed. The smaller scale maps were used to calculate the acreage of vegetation types with the permit area and the larger scale maps were used to calculate the extent of past and proposed disturbance. Table 16, Disturbed Area Vegetation Acreages contains a breakdown of the extent of each vegetation type within the permit area that has been previously disturbed or is scheduled to be disturbed. The location of each previously approved reference area is also shown on this map.

The extent of all areas previously disturbed by prior mining activities are delineated on Map 34, Disturbed Area Vegetation and Map 36, Corner Canyon Fan Site Vegetation. The extent of areas proposed for disturbance is shown on Map 35, Gentry Mountain Shaft Site Vegetation Map and Map 34, Sheet 5, Disturbed Area Vegetation Map.

Reference Area locations are shown on Map 34, Disturbed Area Vegetation and Map 36, Corner Canyon Fan Site Vegetation.

Information presented on these maps was compiled from a variety of sources. Mapping originally conducted for PMC in 1980 and 1981 was used as a basis for portions of these maps. Mapping completed in these two years was conducted by Endangered Plant Studies, Inc. (EPS) and consisted of work covering the lower portion of the surface facilities area, particularly those areas surrounding the proposed Refuse Expansion Area. Endangered Plant Studies, Inc. also conducted survey work on the proposed Gentry Mountain Shaft Site Area. During 1981, quantitative data was collected on all vegetative communities and reference areas established for all areas east of the Star Point No. 1 Mine Area. The 1981 data was used by PMC in connection with Permit Act 007/006.

In 1982, the Environmental Services Group of Getty Mining Company conducted detailed vegetation surveys at the proposed Corner Canyon Fan Site, the proposed Subsoil Stockpile Area and in the proposed Unit Train Loadout Area. Concurrent with the sampling of these three areas proposed for disturbance, PMC obtained approval for the location of reference areas and sampling techniques to be utilized. Field data collected in 1982 was utilized by PMC in 1983 to prepare and submit formal permit

applications for the Unit Train Loadout Minor Modification. Information on the location of each specific transect site are unavailable from either the 1981 or 1982 inventories. Areas sampled in all instances were confined to the proposed area of disturbance and corresponding reference area when applicable. Where areas were already disturbed as is the case in the 1981 monitoring, reference areas were selected based upon the professional judgement of the persons conducting the survey and with the approval of DOGM prior to finalization of the sampling program.

Mapping for the remainder of the permit area was completed during July of 1986. Initially, vegetation types were mapped from a combination of color and black and white aerial photographs taken in 1983 and 1985 respectively. Field verification of the mapping including the current extent of disturbance was conducted during the second week of July, 1986. Previously generated range habitat cover maps generated by the Manti-LaSal National Forest were also utilized to collaborate the aerial photographs.

Since no information could be obtained outlining the characteristics of the vegetation prior to 1916 when the mine opened, photographs taken in 1976, prior to the current major buildup, were used and professional judgement was used to extrapolate the community types for previously disturbed areas. Since 1978, SCS soils mapping involved the same kind of extrapolation. PMC feels that the current assessment is the best available in light of the available information. Table 16, Disturbed Area Vegetation Acreage, indicates that the current permit area encompasses 6149 acres. The lower portions of the permit area are dominated by pinyon-juniper, sagebrush and saltbush vegetation types. The mountainous portions of the permit area are dominated by coniferous forests containing Douglas fir, spruce and subalpine fir with the deciduous species aspen, and mountain shrub communities. Grass dominated areas are also common in many mountainous areas. Vegetation species encountered during the various studies conducted on the permit area have been listed in Table 17, Vegetation Species List.

PLANT COMMUNITY DESCRIPTIONS

According to Table 16, Disturbed Area Vegetation Acreages, seven vegetation types have been disturbed in connection with prior mining activities. In addition to these seven vegetation types, it is possible that two additional vegetation types might be disturbed in connection with the proposed Gentry Mountain Shaft Site. Each of the vegetation types is discussed in the following narrative.

Mountain Shrub Community

The Mountain Shrub Community consists of a small finger-like ridge south and just west of the existing coal refuse pile and another area north and east of the Lion Deck Portal. Dominant plants are Amelanchier utahensis, Cercocarpus montanus, and Symphoricarpos oreophilus. Artemisia tridentata is also an important component of this community. The substrate on which the mountain shrub grows has little usable topsoil, and both areas are profuse with large boulders.

The Mountain Shrub Reference Area closely corresponds to the mountain shrub communities to be impacted in the vicinity of the Coal Refuse Pile. The area is approximately 0.25 miles to the southeast of the Coal Refuse expansion site on slopes south of a major drainage (Map 34, Disturbed Area Vegetation - Sheet 6).

The Mountain Shrub Community in the area is not currently grazed by livestock and is presently utilized only by wildlife. No evidence of fire or reseeding is found in this area.

Pinyon-Juniper Community

This community exists on many of the drier sites with poor soils often on south facing slopes. Pinus edulis and Juniperus osteosperma are dominant with a sparse understory of shrubs, forbs, and grasses. Prominent shrubs found within this community include Artemisia tridentata, Amelanchier utahensis, Cercocarpus montanus, and Symphoricarpus oreophilus. Among the sparse grass cover of mainly Agropyron trachycaulum, Elymus salinus, Koeleria cristata, and Oryzopsis

hymenoides, are intermixed forbs including Grindelia squarrosa, Astragalas coltonii, and Eriogonums.

Extensive portions of this type were disturbed by mining associated activities prior to recent legislation governing reclamation. These portions that remain are used primarily as winter range by mule deer. At the Plateau Mine Site this type is most common in the area of the topsoil stock piles, the wash plant complex and the Lion Deck Portal Access Road.

Douglas Fir Community

The steep north facing slopes in the area extending from the No. 1 Mine westward to the Lion Deck Portal Area are inhabited by a Douglas Fir forest. The community also exists at the Mudwater Canyon Fan Site. Dominant species are Pseudotsuga menziesii, Amelanchier utahensis and Prunus virginiana. In the Star Point No. 1 Mine area the community is a mosaic of seral stages ranging from relatively young stands to stands of almost climax forest. Herbaceous understory species account for approximately one percent or less of the total cover.

This plant community is used primarily as summer range for mule deer and as cover by small mammals and birds. It is grazed only by wildlife in the mine area. Due to the steepness of slopes, it does not appear to have been cut for timber.

Sagebrush Community

The sagebrush community exists in flatter areas near the wash plant and coal refuse pile. Well developed plants of Artemisia tridentata are dominant in the vegetative type. A belt of robust Artemisia tridentata runs east-west through the middle of the flat where sandstone bedrock at a depth of 30 inches allows for greater water accumulation. Very few species other than Artemisia tridentata occur in the area.

No similar community existed in the immediate vicinity of the coal refuse pile. Therefore, a Sagebrush Reference Area was selected some distance away from the area of disturbance. (Map 34, Disturbed Area Vegetation

Sheet 6). Soil is the same for the reference area as for the community that will be impacted.

This type is the most commonly used as mule deer winter range. No evidence of fire could be found in this area. The existence of crested wheatgrass (Agropyron cristatum) in this type suggests that some form of range improvement was attempted in this area.

Mountain Grassland Community

Scattered in intermittent patches between the stands of Douglas fir forest in the Star Point No. 1 Mine area westward towards the Lion Deck Portal are grassland communities. Elymus salinus is the dominant species accompanied by a host of forb species, the most notable of which are Astragalus coltonii and Achillea millefolium.

Grassland Community

This community exists in the Gentry Mountain Shaft Site (Map 35, Gentry Mountain Shaft Site Vegetation). Total cover equals approximately 71 percent (Table 21, Total Plant Cover and Species Diversity of the Gentry Mountain Grassland Community). Poa pratensis is the dominant grass with over 20 percent of the total cover. Other frequently observed grasses are Argropyron trachycaulum, Bromus carinatus, and Bromus inermis, which together account for approximately 14 percent of the total cover. Frequently observed forb species include western yarrow at 13 percent and dandelion at 12 percent of the total cover.

Shrub-Grassland Community

This community exists in the Gentry Mountain Shaft Site. Total cover equals approximately 76 percent (Table 23, Total Plant Cover and Species Diversity of the Gentry Mountain Shrub-Grassland Community). The general aspect of the community is sagebrush-grass with sparsely scatter clumps of Ribes. However, Lathyrus lanzwertii and Taraxacum officinale, two forbs, are the most frequently observed species at 12 and 10 percent of the total cover. Artemisia tridentata and Chrysothamnus viscidiflorus together comprise approximately 14 percent of the total cover.

Agropyron trachycaulum and Poa pratensis account for approximately 16 percent.

Grass-Sagebrush Community

Total cover is approximately 50 percent with Elymus salinus accounting for over 30 percent. Artemisia tridentata, Cercocarpus montanus, and Chrysothamnus viscidiflorus are dominant shrubs in the community, but together only account for approximately 6 percent of the total cover (Table 24, Total Plant Cover and Species Diversity of the Gentry Mountain Grass-Sagebrush Community).

Aspen Community

This community occurs at the Corner Canyon Fan Site and in the proposed Gentry Mountain Shaft Site Area (Maps 35 and 36, Gentry Mountain Shaft Site and Corner Canyon Fan Site Vegetation). Total herbaceous understory cover equals approximately 63 percent. Lupinus sericeus accounts for approximately 20 percent of the total cover. Agropyron trachycaulum is the most dominant grass with over 8 percent of the total cover. Shrubs occurring most frequently are Rosa woodsii with 7 percent and Symphoricarpus oreophilus with 8 percent of the total cover.

Saltbush Community

This community occurs along the lower portion of the Unit Train Loadout Area. The total plant cover of this site averaged approximately 16 percent. The shrub component provided most of the ground cover followed by grasses and forbs. The dominant specie was the shrub, shadscale saltbush which accounted for nearly 41 percent of the total ground cover. The grass, slender wheatgrass (Agropyron tractiycaulum) was the second most common species and accounted for over 26 percent of the ground cover. The dominate forb was a buckwheat (Eriogonum spp.) which accounted for 8 percent of the total ground cover.

This site occupies steep shaley areas with poorly developed soils and high surface runoff. Due to the low growth of the vegetation it is not widely used as mule deer winter range even though it lies in this area.

QUANTATIVE VEGETATION SAMPLING

Reference areas and predisturbance areas were sampled based upon the similarity of the areas previously disturbed or proposed for disturbance in 1981 and 1982. Two predisturbance areas and reference areas identified as the Mountain Shrub and Sagebrush Reference were selected and sampled in 1981 in the Refuse Expansion Area. In addition to the two areas sampled in the Refuse Expansion Area, reference areas representing the Mountain Grassland and Douglas Fir Communities (previously disturbed in the areas between the Star Point No. 1 Mine Area and the Lion Deck Portal) were also established (Map 34, Disturbed Area Vegetation - Sheet 8). A Pinyon-Juniper Reference Area was also established in 1981. The vegetation communities in the proposed Gentry Mountain Shaft Site Area were also sampled in 1981. Sampling in 1982 was conducted at the Corner Canyon Fan Site, Aspen Community Type, the Subsoil Stockpile - Pinyon Juniper Type and for the Unit Train Loadout, Saltbush Community Type.

1981 DATA COLLECTION

The 1981 data collection was conducted by EPS. Field studies were conducted between June and September 1981 for all previously disturbed mine areas and the proposed Refuse Expansion Area using the following methodologies:

METHODS

Cover

Cover data for herbaceous and shrub understory species was obtained by use of the ocular estimation method. One hundred foot long transects were randomly placed in stands representing each community type. A two by five decimeter quadrat, divided into segments to assure greater accuracy in estimation of cover, was randomly placed at ten points along each transect, and the percentage of vegetative cover, bare ground, and litter estimated.

Shrub cover was taken using the line intercept method. One hundred foot long transects were randomly placed in stands representative of shrub communities. The intersection of canopy cover along the transect was

measured within ten foot segments. Measurements were recorded based on total cover equalling 100 percent. The dominant species was measured where the cover of different species overlapped.

Woody Plant Densities

Measurement of stems per acre was obtained by counting the number of stems originating within a one foot wide belt along the line intercept transect. Stems were recorded according to stem class sizes (0-1 inches, 1-2 inches, and 2-3 inches), and measurements indicate the total number of stems per acre, which is not to be interpreted as the total number of shrubs per acre. Some single shrubs consist of numerous stems. (The number of stems per acre was determined by dividing the total number of square feet in the sample area into the number of square feet in an acre, 43,560. This number was multiplied by the number of stems found in the sample area to determine stems per acre.) Shrub height by species was measured by the use of a meter stick divided into decimeters and recorded coincident with measurement of stems per acre.

Tree Density, Species Composition, and Stand Maturity

Tree density, species composition, and stand maturity of the spruce-fir, aspen and pinyon-juniper community types were measured using the quarter method (Curtis 1956), which gives relative cover and relative density values. Sampling points were selected randomly along the transect used to collect cover and woody plant densities. At each quadrat the distance to the closest individual was measured along with the diameter and height of the tree. Core samples from trees encountered while using the quarter method were brought back to the laboratory and annual growth rings counted. Successional status of tree stands was inferred from the studies involving measurements of species, composition, age, and size class distribution of trees.

Shrub Height

Shrub height by species was measured coincident with measurements taken by the line intercept method on shrub communities.

Maximum Sample Size

In a meeting with DOGM on July 15, 1981, requirements for fulfilling sample adequacy were presented. The maximum number of sample plots needed for characterization of a given community type was placed at forty, even if the adequacy formula indicated more than forty plots were needed. During this sampling process, in 11 cases where an 80 percent confidence level was not reached, at least fifty samples were taken, thus satisfying the requirments of DOGM.

1982 DATA COLLECTION

SUBSOIL STOCKPILE - PINYON JUNIPER REFERENCE AREA

During April and May of 1982, PMC held numerous discussions with DOGM regarding the need to expand the Refuse Expansion Area and create a new soil stockpile located northeast of the wash plant area. On May 28, 1982, PMC submitted a minor modification to DOGM to initiate permitting actions on this plan. On June 15, 1982 DOGM sent PMC a review of this submittal with the stipulation that the area inspected and flagged by DOGM personnel on June 8, 1982 be established as a reference area for the subsoil stockpile area. DOGM also stipulated that the area be sampled on east and west aspects during the first two weeks of July and that the results of this monitoring be submitted by August 31, 1982. According to the DOGM stipulations, the Getty Mining Company Environmental Services Group completed sampling at the area in July, 1982. The Subsoil Stockpile Pinyon-Juniper Reference Area is representative of the Pinyon-Juniper plant community found in the area of the mining operation, and is the current reference area used for this vegetation type.

METHODS

Cover and Woody Plant Density

Field data were collected on plant cover and woody plant density from randomly placed 50 meter long transects. Cover data were estimated from a 10 point frame positioned every 5 meters along the transect. A total of 100 hits were recorded for each transect. Woody plant density was determined by counting the total number of woody plants by each species occurring within one or two meters of the 50 meter tape thus resulting in

a 2 x 50 meter belt transect. The average plant cover per transect and the total number of woody plants rooted within the 2 x 50 meter or 4 x 50 meter belt transect were used as one datum for determining sampling adequacy.

CORNER CANYON FAN SITE

Aspen Community

On July 9th and 10th, 1982, the Getty Mining Company, Environmental Services Group sampled the vegetation characteristics at the proposed Corner Canyon Break Out Fan Site. Initially two vegetation types were sampled: aspen and Douglas fir types. Both data bases were originally submitted to DOGM on July 12, 1982. Upon construction of the fan site, the overall extent of planned disturbance was reduced and only 0.44 acres of the aspen type were affected by the construction activities. This submittal will therefore discuss only the aspen community type with respect to vegetation sampling requirements.

METHODS

Cover and Woody Plant Density

Cover and woody plant density were the only parameters sampled at this site. Plant cover was collected through the use of an inclined ten point frame using the same techniques previously described for the subsoil stockpile. Woody plant density was obtained by counting shrubs and trees by species in different sized transects. Shrub density data were collected by counting each woody stem rooted within a 2 x 50 meter belt transect. Trees were sampled using the same technique except the plot size was 4 x 50 meters. All vegetation data was collected on standardized field sheets and transferred to data summary sheets for statistical analysis.

UNIT TRAIN LOADOUT AREA

Saltbush Community

During the same period, the Getty Mining Company, Environmental Services Group also sampled two vegetation communities associated with the Unit Train Loadout Area, being the saltbush and predisturbance pinyon-juniper communities. The same vegetation sampling techniques described to

establish the Subsoil Stockpile and Aspen Reference Areas were utilized in these two areas. Since the areal extent of the pinyon-juniper community disturbed in the construction of the Unit Train Loadout Facility disturbed less than 0.20 acres of this type, PMC sees no reason to describe this community separately in the present submittal. The DOGM Vegetation Guidelines state that reference area comparisons for disturbances less than one acre in size are unnecessary. PMC proposes in the current submittal that for purposes of bond release, this small tract be combined with the adjacent and more extensive saltbush community found in this area.

METHODS

Cover and Woody Plant Density

Plant cover was obtained using the inclined ten point frame described for the subsoil stockpile - Pinyon Juniper Reference Area and aspen communities. Woody plant density was collected using a 2 x 50 meter belt transect.

Sample Adequacy

Usually after completion of 10 or 20 or more samples for each method, a test for adequacy of sample was taken. Additional samples were then taken when considered reasonable and necessary. Sample adequacy is determined by using the following formula obtained from the DOGM Vegetation Guidelines:

$$n = \frac{t^2 s^2}{d^2}$$

where:

- n = sample adequacy
- t = a constant (1.645 for grasslands, indicating an 80 percent confidence level, and 1.282 for shrublands, indicating a 90 percent confidence level)
- s = standard deviation
- d = one-tenth of the mean

Species Diversity

Plant species diversity for each vegetative type is based on those species encountered while sampling for cover in the pre-disturbance and reference areas. A weighted diversity measure was obtained by use of the Shannon-Weiner Index (Bonham 1980). Diversity values are included with cover measurements in the appended tables.

SAMPLING RESULTS

STAR POINT NO. 1 MINE AREA

Douglas Fir Community

Since all of the disturbance associated with the Douglas fir community occurred prior to 1981, it was impossible to sample predisturbance areas for this type. A reference area adjacent to the disturbed area was established (Map 34, Disturbed Area Vegetation Map).

Of the species encountered, Douglas fir, Pseudotsuga menziesii is the dominant species accounting for 87 percent of the total number of trees (Table 18, Woody Plant Density Calculations of the Douglas Fir Reference Area (1956). Measurements of trunk diameter indicate that the majority of the trees are under 12 inches in diameter. Acer grandidentatum comprises 9 percent of the total, and infrequent occurrences of Amelanchier utahensis, Prunus virginiana and Populus tremuloides make up the remainder of the tree species in this community. Total tree density if 427 per acre. Ages of Douglas Fir in this area ranged from a minimum of 17 years to a maximum of 168 years. The site index was found to equal 40.

Total understory herbaceous cover in this community equals approximately 15 percent (Table 30, Total Plant Cover and Species Diversity for the Douglas Fir Community). Elymus salinus and Leucopoa kingii account for over half of the total cover, with Poa fendleriana and Potentilla concinna as other important species. Litter is heavy (almost 75 percent) which is to be expected in this vegetative type.

Sample adequacy (Table 19, Reference Area Sample Adequacy Calculations) was tested after 50 sampling plots had been measured. It is suggested

that because of the low percentage of herbaceous cover, resulting in a very high variance in measurements, that 50 plots be considered adequate.

Sagebrush Community

Total cover in the sagebrush predisturbance area was found to equal 42.1 percent (Table 28, Total Plant Cover, Composition and Species Diversity Comparisons for the Predisturbance and Reference Sagebrush Areas). The majority of the remaining percentage was found to be bare ground at 32.7 percent, and with litter comprising 25.2 percent. Artemisia tridentata was the dominant species with over 30 percent of the total cover. Sitanion histrix was found to be the next most frequent species with 4.9 percent of the total cover. Canopy cover for the sagebrush community in the predisturbance site was measured at 55.0 percent (Table 29, Line Intercept Canopy Cover Comparisons of the Predisturbance and Reference Areas for the Sagebrush Community). Stems per acre were measured for big sagebrush at 19,776 (Table 34, Woody Plant Density Characteristics of the Predisturbance Sagebrush Community). Once again, however, the total number of actual shrubs was measured separately indicating 13,329 shrubs per acre. T-values were calculated comparing the sampling means of the predisturbance and reference sites (Table 33, Statistical Comparison of the Predisturbance and Reference Areas sampled in 1981). The t-value for cover measurements indicated the sampling means are not significantly different at the .05 probability level. The t-value for cover measurements indicated that the sampling means are significantly different at all levels of probability. The t-value for stems per acre measurements indicated the sampling means were not significantly different at the .10 probability level. The Sorensen's Index of Similarity, which determines similarity based on composition of species, indicated that the paired reference and predisturbance sites are very similar in percentage of species composition. The index value was .77.

Total plant cover in the Sagebrush Reference Area was found to equal 33.7 percent (Table 28, Total Plant Cover, Composition and Species Diversity Comparisons for the Predisturbance and Reference Sagebrush

Areas). Most of the remaining area consists of bare ground, with a small portion of litter. Artemisia tridentata is the most dominant species comprising 26.7 percent of the total cover. Sitanion histrix is the next most frequent species with 4.2 percent of the total cover. The total number of species encountered in this community type was 13.

Shrub cover was measured by the line intercept method. The cover of Artemisia tridentata measured 35.6 percent (Table 29, Line Intercept Canopy Cover Comparisons of the Predisturbance and Reference Areas for the Sagebrush Community). Measurement of woody plants indicated 17,163 stems of Artemisia tridentata per acre (Table 20, Woody Plant Density Characteristics of the Sagebrush Reference Area).

Sample adequacy was calculated for shrub cover in the sagebrush community after sampling 50 ten foot segments and was found to be sufficient at the 80 percent confidence level (Table 19, Reference Area Sample Adequacy Calculations). Adequacy of sample was calculated for total cover after 50 herbaceous plots had been measured. Results indicated 84 plots were needed to characterize the community type at the 80 percent confidence level. Total cover other than Artemisia tridentata in this community is minimal at only 7 percent. The majority of the community consists of bare ground. Because of these reasons, consultation with DOGM (June 8, 1981) resulted in the granting of a variance with regard to cover sample size. A total of 50 plots (which is adequate at the 55 percent confidence level) was deemed sufficient. Sample adequacy was calculated on woody plant density after 50 ten foot segments were measured and found to be adequate at the 80 percent confidence level.

Table 19, Reference Area Sample Adequacy Calculations, is a summary of sample adequacy information for the sampling methods used in each reference area. The number of samples listed is the actual number measured. The confidence level listed is the percent at which the number of samples taken is deemed adequate. Some observations need discussion. When measurements are taken within homogeneous communities, variability is sufficiently uniform to insure that sample adequacy is met by a

reasonable number of measurements. However, when the community is either high in species diversity or extremely sparse with a large percentage of bare ground present, variability is high and an unreasonable sample size is required to meet adequacy standards.

Mountain Shrub Community

Average total cover in the mountain shrub predisturbance area was found to equal 45.1 percent (Table 25, Total Plant Cover Composition and Species Diversity Comparisons for the Predisturbance and Reference Mountain Shrub Areas). Litter averaged 44.5 percent, with bare ground averaging around 10 percent. Eleven different species were encountered during the sampling procedure. Of the low-cover species, Artemisia tridentata, Symphoricarpos oreophilus, and Elymus salinus were most frequent with 8.5 percent cover, 13.4 percent cover, and 11.8 percent cover, respectively. Other prominent species were Astragalus convallarius and Hedysarum boreale. Measurements of canopy cover indicated that Amelanchier utahensis composed approximately 47 percent of the shrubs while Cercocarpus montanus composed 37 percent, Symphoricarpos oreophilus 9 percent, Artemisia tridentata 5 percent, and Chrysothamnus viscidiflorus 2 percent (Table 19, Line Intercept Canopy Cover Comparisons of the Predisturbance and Reference Areas for the Mountain Shrub Community). Stems per acre measurements showed Symphoricarpos oreophilus with 13,330, Cercocarpus montanus with 10,542, Amelanchier utahensis with 2,614, Artemisia tridentata with 1,394, and Chrysothamnus viscidiflorus with 436 (Table 32, Woody Plant Density Characteristics of the Predisturbance Mountain Shrub Communities). Actual shrubs originating within the transect were counted separately from stems. The number of actual shrubs per acre were as follows. Amelanchier utahensis 1,655, Cercocarpus montanus 1,742, Artemisia tridentata 1,045, Symphoricarpos oreophilus 610, and Chrysothamnus viscidiflorus 174.

Average total plant cover in the mountain shrub reference area was found to equal 49.1 percent (Table 25, Total Plant Cover, Composition and Species Diversity Comparisons for the Premine and Reference Mountain Shrub Areas). Most of the remaining area consists of litter, with bare ground as a minimal portion of the community. Twenty different species were encountered during the sampling procedure. Of the high cover species, Artemisia tridentata and Elymus salinus were most frequent at over 9 percent each. Other prominent forb and grass species were Penstemon watsonii and Poa fendleriana. Measurements of shrub canopy

cover (Table 26, Line Intercept Canopy Cover Comparisons of the Predisturbance and Reference Areas for the Mountain Shrub Community) indicated the dominant species as Artemisia tridentata (10.4 percent) Symphoricarpus oreophilus (at 2.2 percent) and Amelanchier utahensis (over 30 percent). Measurement of stems per acre by species were 5,750 for Symphoricarpus oreophilus, 12,632 for Amelanchier utahensis, and 5,315 for Artemisia tridentata (Table 27, Woody Plant Density Characteristics of the Mountain Shrub Reference Area).

Sample adequacy (Table 19, Reference Area Sample Adequacy Calculations) for cover measurements of forb, grass, and sagebrush species was calculated after 25 quadrats were sampled. An 80 percent confidence level of sampling was found to be adequate. Shrub cover was measured by the line intercept method. Total canopy cover after 50 ten foot segments were matured and calculated by the line intercept method which were found to equal 46.5 percent. Stems per acre were calculated from data obtained by measuring 10 foot segments of a one foot wide belt transect. After 50 segments were measured, sample adequacy calculations indicated 67 additional segments needed to be measured to satisfy characterization at the 80 percent confidence level.

The t-values for all three sampling methods in the mountain shrub community indicate that the sampling means of the predisturbance and reference sites are not significantly different at the .10 probability level (Table 33, Statistical Comparison of Predisturbance and Reference Areas Sampled in 1981). Species composition similarity was calculated using the Sorensen's Index of Similarity. The index number for the paired sites is .31, a relatively low similarity value. This may be explained by the fact that many species which were encountered during spring sampling of the reference site were not encountered while sampling the predisturbance site. Most of these species flourish in the spring time and essentially disappear by midsummer. Spring-flowering species encountered during sampling of the reference area are: Calochortus nuttallii, Crepis occidentalis, Cymopterus longipes, Erigeron eatonii, Penstemon carnosus, Penstemon watsonii, and Phlox

longifolia. These species comprised 10.2 percent of the reference area, but did not occur in the predisturbance sampling.

Mountain Grassland Community

As was the situation with the Douglas fir community all of the areas in this community were disturbed prior to any vegetation sampling. Therefore, the only sampling that was conducted was to establish a reference area next to the area previously disturbed.

Total cover for this community is approximately 44 percent (Table 31, Total Plant Cover and Species Diversity of the Mountain Grassland Community). Elymus salinus is the dominant species at over 25 percent of the total cover. Astragalus coltoni and Achillea millefolium are the most frequently observed forb species. Chrysothamnus viscidiflorus and seedlings of Pseudotsuga menziesii also occur sporadically throughout the community.

Adequacy of sample was calculated after 40 plots had been taken and found to be adequate at the 90 percent confidence level (Table 19, Reference Area Sample Adequacy Calculations).

GENTRY MOUNTAIN SHAFT SITE

PMC anticipates the potential need to establish an air shaft on Gentry Mountain sometime in the future. The detailed planning for this activity has not been completed so specific predisturbance and reference area sites cannot be sampled. The general area was sampled in 1981 by EPS, Inc., and the results for each of the two plant communities likely to be impacted by the shaft are summarized below.

Grassland Community

This community exists in the Gentry Mountain Shaft Site. (Map 35, Gentry Mountain Shaft Site Vegetation). Total cover equals approximately 71 percent (Table 21, Total Plant Cover and Species Diversity of the Gentry Mountain Grassland Community). Poa pratensis is the dominant grass with over 20 percent of the total cover. Other frequently observed grasses are Agropyron trachycaulum, Bromus carinatus, and Bromus

inermis, which together account for approximately 14 percent of the total cover. Frequently observed forb species include western yarrow at 13 percent and dandelion at 12 percent of the total cover.

Sample adequacy was calculated after 20 plots had been taken and found to be adequate at the 90 percent confidence level (Table 22, Predisturbance Area Sample Adequacy Calculations).

Shrub-Grassland Community

This community only exists at the Gentry Mountain Shaft Site. Total cover equals approximately 76 percent (Table 23, Total Plant Cover and Species Diversity of the Gentry Mountain Shrub-Grassland Community). The general aspect of the community is sagebrush-grass with sparsely scattered clumps of Ribes. However, Lathyrus lanzwertii and Taraxacum officinale, two forbs, are the most frequently observed species at 12 and 10 percent of the total cover. Artemisia tridentata and Chrysothamnus viscidiflorus together comprise approximately 14 percent of the total cover. Agropyron trachycaulum and Poa pratensis account for approximately 16 percent.

Sample adequacy was calculated after 20 plots had been sampled and found to be adequate at the 90 percent confidence level (Table 22, Predisturbance Area Sample Adequacy Calculations).

Grass-Sagebrush Community

This community only exists at the Gentry Mountain Shaft Site. Total cover is approximately 50 percent with Elymus salinus accounting for over 30 percent. Artemisia tridentata, Cercocarpus montanus, and Chrysothamnus viscidiflorus are the dominant shrubs in the community, but together only account for approximately 6 percent of the total cover (Table 24, Total Plant Cover and Species Diversity of the Gentry Mountain Grass-Sagebrush Community).

Sample adequacy was calculated after 40 plots had been taken and found to be adequate at the 90 percent confidence level (Table 22, Predisturbance Area Sample Adequacy Calculations).

CORNER CANYON FAN SITE

Aspen Community

The area proposed for the fan site was characterized as an Aspen Vegetation Type, with the overstory dominated by Populus tremuloides and an occasional Pseudotsuga menziesii. Dominate understory shrubs consisted of Symphoricarpos oreophilus and Ribes cereum. Herbaceous species dominate in the aspen community included Lathyrus spp., Mertensia spp. and Bromus marginatus. The proposed area to be disturbed was sampled and a reference area located immediately upslope of the proposed disturbance was also established (Map 36, Corner Canyon Fan Site Vegetation Map).

A comparison of the proposed disturbance area revealed that total plant cover averaged 87.58 percent and litter averaged 11 percent (Table 42, Corner Canyon Aspen Predisturbance Plant Cover). Bare ground and rock totalled a combined 1.42 percent. Shrub density was calculated to equal 32.36 plants per $100m^2$ and tree density was calculated to equal 30.7 plants per $200m^2$ (Table 44, Corner Canyon Aspen Predisturbance Woody Plant Density). The Sorensen's Species Index for the predisturbance site was calculated to equal 0.68. Reference area total plant cover was found to equal 92.27 percent and litter equalled 7.13 percent. Bare ground and rock totalled 0.6 percent (Table 45, Corner Canyon Aspen Reference Area Plant Cover).

Shrub density in the reference area was found to equal 20.53 plants per $100m^2$ and tree density was calculated to equal 31.27 plants per $200m^2$ (Table 46, Corner Canyon Aspen Reference Area Woody Plant Density). A quantitative comparison of these two areas revealed the following statistics. Sample adequacy was obtained for shrub density, tree density and plant cover for both the predisturbance and reference area. The cover sample adequacy equalled 2 and 1 samples respectively. Shrub density was found to equal 2 and 7 samples, respectively. Tree density was adequate with 2 samples for the predisturbance area and 9 samples for the reference area. The minimum number of samples taken for any parameter was 11 transects for sample adequacy, so sampling was adequate.

A statistical comparison of these two areas and the respective parameters evaluated revealed that the calculated t statistic for shrub density was found to equal 1.407 which was less than the table value of 1.708. The means for these two parameters were therefore considered equal. The t-statistic for tree density was calculated to be 3.919 which was higher than the table value of 1.711. The t-statistic for total plant cover was calculated to equal 1.958 which was also higher than the table value of 1.708. Differences between the means for tree density and plant cover were significantly different between the predisturbance and reference areas. In all instances a higher value was associated with the reference area and this data was accepted previously by the DOGM during the Corner Canyon Permit Application process.

UNIT TRAIN LOADOUT AREA

Saltbush Community

In this area, 16 transects were run to describe plant cover in the predisturbance area and 15 transects to describe cover in the saltbush vegetation reference area. Woody plant density was obtained by taking twenty-eight 2 meter x 50 meter transects in the predisturbance area and twenty 2 meter x 50 meter transects in the designated reference area.

The saltbush community was dominated by Atriplex confertifolia which comprised over 40 percent of the total plant cover on both areas sampled (Table 39, Saltbush Vegetation Type Predisturbance Plant Cover and Table 40, Saltbush Vegetation Type Reference Area Plant Cover). Agropyron trachycaulum was the next most dominate species. Eriogonum and Elymus salinus were found in smaller amounts, but were common in the predisturbance area. Atriplex confertifolia was the most common shrub followed in abundance by Atriplex canescens and low sagebrush, Artemisia pedatifida.

Total plant cover of the predisturbance size was found to equal 16.31 percent after 16 transects were taken. Sample adequacy was achieved with 14 transects (Table 39, Saltbush Vegetation Type Predisturbance Plant Cover). A total of 15 transects were taken to characterize the Saltbush Reference Area. Average plant cover was found

to equal 17.56 percent after 15 transects were collected. Sample adequacy was achieved with 11 transects in the Saltbush Reference Area (Table 40, Saltbush Vegetation Type Reference Area). Species diversity as calculated with the Shannon-Weiner Diversity Index was 0.746 for the predisturbance area and 0.545 on the reference area. Calculation of the Sorensen's Similarity Index for these two sites yielded a value of 52.2. A statistical comparison of the cover and shrub density values between these two sites yielded calculated t-values of 0.734 for cover and 0.404 for shrub density indicating that alpha equals 0.10. The sites were similar with respect to these two parameters (Table 41, Saltbush Vegetation Type Predisturbance Area Woody Plant Density and Table 42, Saltbush Vegetation Type Reference Area Woody Plant Density).

Subsoil Stockpile - Pinyon-Juniper Reference Area

As has been explained previously in 1981 a Pinyon-Juniper Reference Area was established at PMC for the previously disturbed Pinyon-Juniper Areas and for the then proposed Unit Train Loadout Site. A second Pinyon Juniper Reference Area was established in 1982 for the proposed Subsoil Stockpile. This new Pinyon-Juniper Reference Area was stipulated by DOGM to have east and west aspects. Both areas were located and flagged by DOGM personnel on June 8, 1982 and PMC was required to sample each aspect separately and submit the data to DOGM.

During May 1986, PMC, in a meeting to DOGM attended by Lynn Kunzler and Kathy Mutz, PMC suggested that it was somewhat unreasonable for a mine the size of PMC's to have three Pinyon-Juniper Reference Areas. A site visit was arranged to examine this issue with Kathy Mutz and Dan Duce. DOGM agreed after visiting the areas, that the 1981 reference area for the Pinyon-Juniper Community could be abandoned since the new Subsoil Stockpile - Pinyon-Juniper Reference Area was more representative of the site conditions of the pinyon-juniper areas previously disturbed. The only map references or discussion relative to the current Pinyon-Juniper East Aspect Reference Area, Pinyon-Juniper West Aspect Reference Area, Topsoil Stockpile, or Subsoil Stockpile Reference Area are discussed in the present permit application as the Suboil Stockpile -Pinyon-Juniper Reference Area.

Subsoil Stockpile - Pinyon-Juniper Reference Area

The location of these two Subsoil Stockpile - Pinyon-Juniper Reference Areas is delineated on Map 34, Permit Area Vegetation - Sheet 6. The original permit application submitted on August 24, 1982 states that transect locations were submitted on a map. Recent attempts to locate this map have proven unsuccessful. It is suggested that the copy of the DOGM submittal be consulted for the locations of individual transects.

Results of this sampling revealed that the Pinyon-Juniper type is characterized by Juniperus osteosperma and Pinus edulis and an understory of Artemisia tridentata and Cercocarpus montanus. Eriogonum is also common in this area. A comparison of aspect indicates that the more mesic east facing slope has significantly higher shrub densities and total plant cover. The west facing slopes of this reference area are typical of most of the pinyon juniper acreage mapped adjacent to the Unit Train Loadout conveyor and in the area from the Wash Plant westward along the Lion Deck Portal Access Road. A comparison of Table 35, Subsoil Stockpile - Pinyon-Juniper West Slope Reference Area Plant Cover and Table 36, Pinyon-Juniper East Slope Plant Cover allow for a comparison of these two different Pinyon-Juniper reference areas. A comparison of woody plant density for the two different reference areas can be found in Table 37, Subsoil Stockpile - Pinyon-Juniper East Slope Reference Area Woody Plant Density and Table 38, Subsoil Stockpile - Pinyon-Juniper West Slope Reference Area Woody Plant Density.

The field data was collected and originally analyzed under the supervision of Dave McMindes, Range Scientist with Getty Oil Company, Environmental Services Group, Coal Department. The field crew was made up of temporary staff members employed for the summer field season by Getty Oil Company. Their names and professional status are as follows:

NAME	TITLE	DEGREE	YEARS FIELD EXPERIENCE
Dave McMindes	Range Scientist	BS Range Science	5
Claire Semmer	Range Technician	BS Botany	4
Carol Taylor	Range Technician	BS Range Science	2
Connie Roberts	Range Technician	Senior, Range Science	1
Brenda Becker	Range Technician	Senior, Range Science	1
Sue Kelso	Range Technician	BS Wildlife Management	2
Kenneth Carlson	Range Technician	MS Soil Science	3
Larry Germain	Range Technician	MS Range Science	4
Tod Zechiel	Range Technician	Junior, Range Science	3
Steve Price	Range Technician	BS Biology	1
Becky Gillan	Range Technician	Senior, Range Science	2

All reference areas established in 1981 and 1982 were reported to have been marked with permanent steel posts. During the 1987 field season, PMC will inspect all reference areas and verify they are all permanently marked. If necessary, permanent markers, such as metal steel posts, will be installed to assure future years data is collected from the same area originally sampled.

Threatened and Endangered Species

No reported observations or collections of threatened or endangered plant species has been documented in various activities associated with the Plateau Mining operations. Aside from similarity of habitat, suggesting the potential possibility of these species occurring in this area, numerous site specific surveys have been conducted in the area and suitable habitat or the presence of known species have ever been discovered.

In 1980 and 1981 Endangered Plant Studies, Inc. conducted detailed literature and field surveys in the permit area. During investigations conducted during the summer of 1981, emphasis was placed on the following four species:

*Eriogonum corymbosum Benth. in D.C. var. davidsei Reveal
*Eriogonum lancifolium Reveal and Brotherson
*Hedysarum occidentale Green var. canone Welsh.
*Hymenoxys helenoides (Rydb) CK11

Investigations utilized the following methods. A quarter section by quarter section field search for these species was made on all of the lease area.

Field transects were conducted by field personnel walking 100 feet apart along parallel transect lines through each quarter section. Results of this survey reported that none of these species or any other species being considered for threatened or endangered status were found in the study area.

In 1982 during the permitting efforts directed at the Corner Canyon Fan Site, the USFWS expressed concerns regarding the possible occurrence of Hedysarum occidentale var. canone in Corner Canyon. Contact with Mr. Bob Thompson of the Manti-LaSal National Forest Supervisors office revealed that his surveys of the Corner Canyon site and surrounding area had failed to locate this species.

During 1984 during the Unit Train Loadout permitting process, the issue was once again examined by the USFWS and a negative determination was made regarding the likelihood of the species of concern existing in this area. Discussions with Mr. Bob Thompson during May, 1986 by PMC's consultant, Kent Crofts, confirmed that no new sitings of any threatened or endangered plant species had recently been made for either the desert or mountain portions of PMC's permit area. Given this information, PMC submits that no known plant species of federal concern will be impacted by the existing or proposed mining operations contained in this mining plan.

Productivity and Range Condition

Various productivity estimates have been obtained for lands within the existing permit area. Doctors' Welsh and Murdock conducted range

condition and productivity studies during 1981. Findings from their surveys for areas pertinent to the current submittal indicated that low elevation pinyon-juniper areas were currently in fair condition and in 1981 produced 1,115 pounds of forage with a potential productivity of 1,650 pounds per acre. Sagebrush lands were also in fair condition and producing 1,400 pounds of forage with a potential yield of 2,000 pounds of forage per acre. Both reference areas established in the No. 1 Mine Area were found to be in excellent condition. The mountain grassland in 1981 yielded 2,300 pounds of forage with a potential yield of 2,300 pounds per acre.

The Douglas Fir Reference Area was in 1981 producing 822 pounds of understory herbaceous vegetation and potential productivity was also given as 822 pounds of forage per acre.

Records obtained from Mr. Bob Thompson of the Manti-LaSal National Forest for the wetern portion of PMC's permit area reveal that vegetation within this area is part of the Castle Valley Ridge C&H Allotment. Vegetation ratings for lands within PMC's Permit Area range from 54 to 64 and indicate an acceptable range condition.

Examination of the SCS files for PMC's Mine revealed at least 11 "range condition record" forms relating to vegetation sampling conducted by SCS Personnel on PMC's Mine Area. Locations of some of these sites could be correlated with soil pits shown on Map 37, Disturbed Area Soils Map for the mine area in Wattis Canyon. All eleven of these forms documented range condition of at least "fair" condition. The Douglas Fir Vegetaton Community (Woodland Range Site) was considered "excellent" and producing 500 pounds of forage when sampled in 1981. The location of this site is SCS Soil Pit #150. Samples correlating with the Pinyon-Juniper Vegetation Type included Soil Pit #530 (Upland Loam Range Site) considered in "fair" condition and yielding 1,200 pounds of forage. Another Pinyon-Juniper site sampled as Pit 1 (Upland Loam Range Site) was in the same class and was producing 1,000 pounds of forage. The Upland Stony Loam also apparently in the Pinyon-Juniper Area was rated in "good" condition and producing 1,500 pounds of forage. Range sites

corresponding to the mountain shrub vegetation type included the mountain brush (Soil Pit #531) in "fair" condition and producing 1,000 pounds of forage; another two mountain brush locations designated as Pits A-4 was in "fair" condition and yielded 1,200 pounds of forage. Three other mountain brush range sites designated as Pits A-5, A-7, and C-1 were in "good" condition and producing 1,200, 1,200 and 1,600 pounds of forage respectively. All reports indicated that the trend was improving. This information is presented to document the acceptability of range condition in reference areas established at the Plateau Mine. Formal letters describing these reference areas are presented in Exhibit B, Vegetation Information.

Records corresponding with the mountain grassland vegetation type (Range Sites High Mountain Loam Pit A-3 and Mountain Loam Range Site Pit A-G) were both considered to be in "good" condition and producing 2,000 and 1,200 pounds of forage respectively.

Correlation of Wildlife Habitat Types and Plant Communities

A detailed discussion on wildlife habitat types and plant communities as they relate to seasonal use patterns is discussed in Section 783.20, Wildlife Resources Information. In addition to this verbal discussion, Map 37, Wildlife Land Use Map, and Map 33, Permit Area Vegetation, allow for easy comparison.

*UMC 783.20 FISH AND WILDLIFE RESOURCES INFORMATION

*(a) EACH APPLICATION SHALL INCLUDE A STUDY OF FISH AND WILDLIFE AND THEIR HABITATS WITHIN THE PROPOSED MINE PLAN AREA WHERE SURFACE OPERATIONS WILL BE CONDUCTED OR FACILITIES LOCATED AND THE PORTIONS OF THE ADJACENT AREAS WHERE EFFECTS ON SUCH RESOURCES MAY REASONABLY BE EXPECTED TO OCCUR.

*(b) PRIOR TO INITIATING SUCH STUDIES, THE APPLICANT SHALL CONTACT THE DIVISION TO DETERMINE WHAT FISH AND WILDLIFE RESOURCES INFORMATION WILL BE REQUIRED.

*(c) THE DIVISION, IN CONSULTATION WITH THE APPROPRIATE STATE AND FEDERAL FISH AND WILDLIFE MANAGEMENT, CONSERVATION, OR LAND MANAGEMENT AGENCIES HAVING RESPONSIBILITIES FOR FISH OR WILDLIFE OR THEIR HABITATS, SHALL DETERMINE THE LEVEL OF DETAIL AND THE AREAS OF SUCH STUDIES ACCORDING TO;

*(1) PUBLISHED DATA AND OTHER INFORMATION,

*(2) SITE SPECIFIC INFORMATION OBTAINED BY THE APPLICANT, AND

*(3) WRITTEN GUIDANCE OBTAINED FROM AGENCIES CONSULTED.

RESPONSE:

Information addressing DOGM and OSM concerns during permit application review have been incorporated where appropriate. All data gathered since the first permit application submittal is presented and the entire wildlife resource is discussed with updates where appropriate.

The purpose of this section is to inventory the wildlife resources in the PMC permit area and to evaluate the impact of the operation of the mine on those resources. The study includes fish, aquatic insects, birds, amphibians, reptiles, and mammals. Analysis entailed a review of the applicable literature, consultation with the relevant agencies, field analysis, and impact evaluation.

In sum, this study uncovers minimum impact on wildlife from continued operation of the mine. Since the Star Point Mines have been worked since 1917, the ecosystem has already stabilized with mining.

1. TERRESTRIAL RESOURCES

This research was designed to qualitatively evaluate the terrestrial vertebrate components in habitats which may be affected by the Star Point Mines. Methodologies were selected to establish faunal compositions and status by habitat type.

1.A. Methodology

The following working objectives were established to provide the necessary evaluation criteria:

1.A.1. Conduct a literature review and detailed analysis of Utah Division of Wildlife Resources' (UDWR) information and initial report and wildlife plan for the Star Point mine project and geographic area of concern.

A thorough literature review was conducted. The libraries at each of the major universities in Utah were surveyed. Special emphasis was given to location of published literature pertinent to the geographic area and

habitat types in question. In addition, unpublished theses were reviewed for pertinent data.

Visits were also made to state and federal agencies that have jurisdiction or control over the study areas. All pertinent reports and management plans were reviewed, and appropriate personnel were questioned.

1.A.2. Contact the regulatory authorities to determine what wildlife information might be required.

The regulatory authorities were contacted by mail, telephone, or personal visit to determine what wildlife information would be required.

1.A.3. Establish study sites in the potentially impacted habitat types for surveys of the terrestrial vertebrates.

Study sites were arbitrarily selected in the habitat types of concern.

1.A.4. Identify and cursorially inventory the terrestrial vertebrates by species for each of the habitats in the area of potential impact. Determine migratory utilization of the habitats.

Literature analysis and field observations were conducted to determine the probable and actual inhabitants of the area of potential impact and to identify habitats significant to their presence and/or persistence. A combination of plots and line transects was used to determine terrestrial vertebrate presence (Hayne, 1949; Emlen, 1977) and habitat utilization (pellet group counts, spotlight census). The transects were 1,000m long and placed in representative areas of the vegetation habitats of concern. Traps and/or observation sites along the transects were spaced at 10-m intervals. This guaranteed that spacing was not in excess of the potential home range of the fauna being sampled.

1.A.5. Categorize the status of each species and highlight those that deserve special attention because they are endangered or threatened or of economic or recreational value.

The methods and procedures essential to accomplishment of this objective involved basically two things. First, all of the species observed or known to inhabit the potential areas of impact were identified to species through Objectives 1 and 4 and listed phylogenetically in tabular form. Second, all species were categorized by habitat, relative abundance, resident species, seasonal use, and/or high interest species. The term "high interest species" designates those animals that require special attention by scientists and/or public management agencies because they are either endangered, threatened, protected game, or of economic or recreational value. The reasons for this high interest designation include: ranges are small, thus restricting population to perhaps a few, although populations may be numerically large, ranges may be small withn the entire represented area, irrespective of population numbers or range, little is known of the current status and in some cases information suggests that populations are declining, species are sensitive to impact and may be in danger of abnormal declines, species are relict or may have aesthetic or scientific value, economic or recreational importance, and combinations of the above.

1.A.6. Evaluate and discuss in report form the significant interactions on the terrstrial vertebrates present. High interest species are to be highlighted.

This objective is satisfied by discussions of the significant habitats, interactions, and potential results of the impacts on the terrestrial vertebrates. The data are summarily presented in tabular and mapped format to illustrate the above discussion. Impact on high interest mammalian species was rated on an impact scale (Table 47, Projected Impact of the Proposed Mine Expansion Area and its Associated Facilities on High Interest Mammals).

The impact scale used rates degrees of harm from no harm = 0 to total loss of the species in the area of concern = 10.

The numerical determination for a given species was determined in the following manner: All of the information that could possibly be obtained within the scope of work for the species in question was gathered from written, field, and verbal sources. The same was true for associated pertinent information regarding the abiotic and biotic habitat as well as the proposed impact action. With this information, the consequences of the action on the species in the area were evaluated and a numerical impact value from 0 to 10 was given. Pertinent points were raised, data were discussed, and the pros and cons of the proposed action were evaluated in view of the criteria applied to the Wattis Planning Unit.

2. EXISTING WILDLIFE RESOURCES

2.A. Wildlife Habitat in Mine Plan Area

The area of potential impact is covered by several important habitats that are used by species considered of "high interest" to various management agencies because of economic or recreation value. There are five major vegetation habitats from a faunal standpoint: pinyon-juniper, salt desert shrub, sagebrush, mixed conifer-aspen, mixed mountain brush-grass, and mixed desert shrub.

2.B. Terrestrial Wildlife and Habitat and Value Determination

Literature and field data were summarized for all terrestrial vertebrates of concern. The species were categorized to determine habitat affinities, high interest species status, and potential perturbation. These results are reported in Tables 48, 49 and 50, Species List and Classification of Mammals, Reptiles and Amphibians Whose Published Ranges Overlap the Mine Area of PMC, and are listed according to their various ecological classifications. All species whose ranges appear to overlap any or all of the potential area of impact are listed.

Generally, the mine plan area could potentially be inhabited by about 53 mammalian, 63 avian, 3 amphibian, and 12 reptilian species (Exhibit 9, Terrestrial Wildlife). A listing of these species with their scientific names is presented in Table 51, Scientific Names For Mammals, Birds, Amphibians and Reptiles of the Plateau Mine Permit Area.

Some of these are considered high interest species for the habitats and local area of concern. High interest wildlife are defined as all game species, any economically important species, and any species of special aesthetic, scientific or educational significance. This includes all federally listed threatened and endangered species of wildlife.

Studies were made during 1981 to accurately determine the numbers of terrestrial vertebrates in the permit area. Population densities are estimated in Table 52, Estimated Population Densities.

2.C. Mammal Resources

The area of potential impact is likely to be inhabited by 53 species of mammals. The names of these animals and their habitat affinities are listed in Table 48, Species List and Classification of Mammals Whose Published Ranges Overlap the Mine Area of Plateau Mining Company. They represent 6 orders and 15 families of mammals. Nineteen species are considered high-interest species, 14 of which are protected by state or federal code. The conifer-aspen and high elevation mountain brush-grass areas near the proposed shaft area, the Corner Canyon Fan Breakout, and the Mudwater Canyon Fan Breakout are used as summer range and possibly calving areas for elk, as well as summer range and fawning areas for mule deer. They are also utilized by cougar, bobcat, coyote, and possibly bear.

The low elevation mountain brush-grass and mixed conifer-aspen habitats in the foothills just above Wattis are utilized by elk during winter and spring. This same area is used during spring, summer, fall and, as indicated by fallen antlers, during winter by a few of the larger deer. However, the major winter area for mule deer is in the pinyon-juniper and mixed desert shrub habitats, along the lower hills and the entire foothill area. In all habitats, water is a critical resource and is possibly the limiting factor. The high interest species will be discussed individually later in this section. It is doubtful that the mine will seriously impact the other 34 species.

2.C.1. Mammals Methods

Field studies were conducted in November, 1981 and July, 1982.

2.C.1.a. Method of Determining Estimated Densities and Conversion Into Animals Per Unit Area - The Haynes method was used. This involves the counting of the number of animals in each established transect. The series of transects form a grid which are over a unit area. Therefore, the number of animals per unit area can be determined.

2.C.1.b. Number of Transects, Traps, and Pellet Groups Per Habitat Type

- Transects (1000 meters/transect)
  - o Pinion Juniper Habitat
  - o Sage Habitat
    Three transects overlapping both habitat types
  - o Salt Desert Shrub Habitat
    1 transect
  - o Mixed Mountain Brush and Grass Habitat
    1 transect
- Traps
  - o 100 traps/transect, 1000 meters/transect, or 1 trap every 10 meters
  - o Pinion Juniper Habitat
  - o Sage Habitat
    300 traps
  - o Salt Desert Shrub Habitat
    100 traps
  - o Mixed Mountain Brush and Grass Habitat
    100 traps
- Pellet Groups
  - o 100 groups/transect, 1000 meters/transect, or 1 group every 10 meters. A two meter radius around each station.
  - o Pinion Juniper Habitat
  - o Sage Habitat
    300 groups

- o Salt Desert Shrub Habitat
  100 groups
- o Mixed Mountain Brush and Grass Habitat
  100 groups

2.C.1.c. Location of Transects (Traps and Pellet Groups)

Transect 1 Section 2,11 T15S R8E
In the proposed unit train area, running parallel to railroad tracks from SW to NE.

Transect 2 Section 10,11 T15S R8F
North of the existing road and running parallel to road in an E NE direction.

Transect 3 W½ Section 10 T15S R8F
Northeast of Wattis and running parallel to railroad tracks from N to S.

Transect 4 Section 15,16 T15S R8E
South of Wattis in the proposed refuse pile extension area.

Transect 5 Section 15 T15S R8E
South of Wattis on hillside, running from railroad tracks toward Wattis.

2.C.1.d. Survey Frequency - Surveys were conducted every night for four nights.

2.C.1.e. Wildlife Data References - Data on wildlife use of the area was obtained from field observations from the references listed at the end of this section and BLM/UDWR Wildlife Land Use Maps of the SE Utah region.

2.C.2. Waste Pile Expansion

The coal waste pile was started prior to the environmental regulations. What is now called Phase I of the waste pile is the extent of the pre-law pile. In 1982, a plan to expand the waste pile to the south and west was approved as a part of the Mining and Reclamation Permit.

2.C.1.a. Present Expansion (Phases II and III).

Expansion of the present waste pile facilities (Phases II and III) will most likely impact the elk, mule deer, cougar, bobcat, mountain and desert cottontail, snowshoe hare, fur bearers, small mammals, amphibians, reptiles, and birds (see Table 53, Potential Impact of the Proposed Mine Expansion Area and its Associated Facilities on High Interest Mammals).

2.C.2.a.1. Elk

The elk herd in the Wattis Planning Unit is a significant resource to the citizens of Utah. The area affected by the expansion of the present waste disposal area is not critical to the elk herd. The mountain brush-grass and mixed conifer-aspen areas surrounding the mine operation are used by elk on a seasonal basis, roughly from November 1 to May 15. The length of time and extent of the area used by the elk depends on the depth and length of time snow remains in the high country. Disturbances to elk during the winter season is most detrimental because of the limited energy reserves of the animals and should be kept to a minimum (Pritchett and Smith, 1980).

It is felt that elk usage of the area is marginal and operation of the Star Point Mines has been ongoing for many years. The expansion should cause minimal disturbance to the elk.

2.C.2.a.2. Mule Deer

The UDWR considers the mule deer on the mine property and adjacent area to be part of herd unit 33. These deer utilize the entire mine plan and adjacent area but seasonally concentrate in and more heavily use specific habitat types. The expansion of the present disposal area makes up only a small percentage of the low altitude mountain-brush, mixed desert shrub and pinyon-juniper habitats used as winter range during normal winters. Excessive snows force deer to abandon the area and move east to areas of less snow and more protection (Pritchett and Smith, 1980).

The browse in the foothills area is generally good and will stand over-wintering of deer in a normal year. Deer, like elk, should not be disturbed during the winter period due to low energy reserves.

2.C.2.a.3. Environmental Consequences

The project will probably result in the displacement of a number of indigenous wildlife species in the immediate area. However, because of the general abundance and distribution of the high interest species that utilize this area, it is felt that very little impact will occur on their overall populations.

2.C.3 Corner Canyon Fan Project

The area of potential impact is likely to be inhabited by twenty-five species of mammals. Twelve species are considered high-interest species, seven of which are protected by State of Federal code. The conifer-aspen and high elevation mountain brush-grass areas near the proposed breakout area is used as summer range and possibly calving areas for elk, as well as summer range and fawning areas for mule deer. They are also utilized by cougar, bobcat, coyote, and bear.

Further details regarding wildlife can be found in Exhibit 11, An Inventory of the Terrestrial Wildlife of Corner Canyon. The report was prepared in August, 1982 by Gar Workmen of Utah State University.

2.C.3.a. Environmental Consequences

The primary impacts on wildlife in the proposal area would be some loss of habitat and some displacement. Of the big game animals, it is expected that the main impact will be to the mule deer. However, the deer currently seem to be very tolerant of the applicant's existing operations and often browse within sight of the operations. No known migration route will be blocked by the project. Considering the very small size of the disturbance (0.3 acres), and that the area is very isolated, in mountainous terrain, very minimal impacts to mule deer are anticipated.

During a site visit to the fan on July 21,1986, deer tracks were observed at the edge of the sediment trap on the fan pad within thirty feet of the fan, which was and had been running for months. Deer seem to be very adaptive to human activity and associated mechanical facilities.

2.C.4. Mammals In Surface Operations Area and Expected Impacts

Only those mammals of major concern to management agencies are individually discussed.

2.C.4.a. Elk

The elk in the Wattis Planning Unit is a significant resource to the citizens of Utah. The elk are thought by the UDWR to be stable and productive. The majority of the potential impact area is not critical to the continued existence and perpetuation of the elk but portions of the area are utilized on a seasonal basis and should be given consideration during mining operations. The conifer-aspen and high elevation mountain brush-grass areas near the breakout and shaft areas are used as summer range and possibly calving areas for elk. Calving would occur from May 15 to July 15 and will be taken into consideration.

Most of the elk using the high conifer-aspen and mountain brush-grass areas during the summer migrate to the west in the winter. Fallen antlers were found in the hills above the mine portal, indicating that a few elk migrate to the hills surrounding the portal and that the low elevation mountain brush-grass and mixed conifer-aspen habitats in the foothills just above Wattis are potentially utilized by elk from November 1 to May 15. The degree of use depends upon the severity of the winter. Excessive snow forces the elk into lower, more open habitats. Elk on winter ranges are notoriously sensitive to disturbance. These animals often have low energy reserves due to depletion by winter conditions; unnecessary disturbances by man can cause them to use critical and limited energy reserves. Such disturbance can result in excessive mortality, as in the winter of 1978-79 or, in less severe cases, to abortion or absorption of fetuses. Both situations reduce the productivity of the herd.

The fact that elk utilize the entire impact area during some portion of the year would normally mean that all aspects and timing of the proposed actions must be considered. The Star Point Mine has been operational for over 60 years and there are minimal new surface facilities planned. These factors, coupled with the fact that elk use is marginal indicates that there should be little, if any, additional disturbance to the elk. The animals have already accommodated human disturbance associated with mining and hauling coal. Subsidence should be of little consequence to the stability of vegetation communities but water resources must be monitored to detect impact. If water degradation or loss is detected an investigation will be conducted to determine possible mitigation.

2.C.4.b. Mule Deer

Mule deer on the PMC Permit Area are considered part of herd unit 33 by UDWR. Historically, through 1977, this herd experienced the same general fluctuations as the other herd units of the state. Populations decreased in the early 1970's primarily due to severe climatic conditions, but took a general upswing through the summer of 1977. Then there were three consecutive years of severe decline wherein the deer were forced to the extreme lower limits of their winter range by abnormally deep and long-lasting snow. Winters since 1980 have generally been colder than normal with greater than normal snowfall forcing the deer into the lower limits of their winter range. The exception to this is the winter of 85-86 which saw greater than normal snowfall, but mild temperatures which kept the snow melted off and thus provided good winter browse for deer allowing them to utilize their entire winter range, and even allowing use of the lower edge of their summer range for winter use.

The animals utilize the entire area of potential impact but seasonally concentrate in, and more heavily utilize, specific habitat types. The high elevation mountain brush-grass and conifer-aspen habitats near the Corner Canyon Fan, Mudwater Canyon Fan and shaft areas are used for summer range and fawning. The low altitude mountain brush, mixed desert shrub, and pinyon-juniper habitats are used as winter range during normal winters; during excessive snow the deer move off the impact area and go east of the Utah Railway railroad tracks. The browse in the

wintering habitats in the impact area is in relatively good condition and can facilitate overwintering of deer in a normal year; however, the same precautionary considerations must be given mule deer as were suggested for elk.

Mitigation measures have been conducted by enhancing winter range as discussed in the Mitigation and Management section to follow. According to Dalton (UDWR, 1980), water has been a limiting factor in mule deer winter range. By constructing eight ponds and fifteen sediment traps in addition to installing a guzzler at the mitigation area, PMC has enhanced and expanded this winter range for deer by providing water sources that were not naturally present. Overland conveyors and mule deer movement are discussed under Mitigation and Management.

2.C.4.c. Cougar

The entire Star Point Mine and proposed expansion area provide yearlong habitat for cougar. Cougars could range throughout the area, but their movements are dictated by migration patterns, human disturbance, and availability of their primary food source, mule deer. Several deer skeletons in ledges and crevices of cliffs in Sections 17 and 18, Township 15 South, Range 8 East, which are in and near the permit area are evidence of cougar presence. Two sightings of cougars immediately above the mine portals have been made in the past five years. In July, 1985, an adult cougar was sighted on the road just below the Lion Deck by one of Plateau's personnel. These sightings seem to indicate that there is a population of cougar in the mine area and that the cats are accustomed to the activity at the mine. In fact, the cat sighted in July 1986 was said to have run along the side of the road parallel with the employee's vehicle for about 200 feet. Since cougars are not abundant and are known to be secretive, avoidance will be practiced when the females are accompanied by young learning to hunt and survive.

This period in the life cycle of the cougar, however, is difficult to determine since they are known to reproduce year round. If cougar populations in the area of potential impact were high, this would be of major concern, but, since numbers are low and ranges extensive compared

to the area of potential impact, the cougars will usually avoid human activity areas and there will be little impact on the overall cougar population.

2.C.4.d. Bobcat

The mine and adjacent areas provide habitats for bobcats. Although little is known about the Utah bobcat, one sensitive period would be late February when parturition occurs. May and June would also be a sensitive period because young bobcats, when first exploring and learning to hunt, are not as secretive as the cougar, making them less likely to avoid high human disturbance areas during these months. However, since this is an ongoing mining operation, impact on bobcats should be unchanged.

2.C.4.e. Black Bear

Only the breakout and ventilation shaft portion of the mine provide potential habitat for black bear, which are neither abundant nor active year round. Sensitive periods in the life cycle of the black bear are February and March when the cubs are born and during early summer when they accompany their mother on initial foraging expeditions. Since parturition occurs within the winter den, disturbance in the black bear habitat will be limited and there will be little impact during this sensitive period. The same is true of the initial foraging forays.

2.C.4.f. Mountain and Desert Cottontails

The entire mine area provides substantial value, yearlong habitats for cottontail rabbits. The young are born between April and July, which is considered a sensitive period, but the proposed actions will in all probability not seriously alter the reproductive potential of the populations. Hunting pressure most likely will not increase nor will illegal kill, however, this would not matter since hunted rabbit populations are more healthy and stable than nonhunted populations. Subsidence could potentially create a problem, but since it is limited to relatively small areas at a time, little overall impact will occur. It should be noted that disturbed vegetation leading to succession (if it occurs) would enhance reproductive potential of cottontail rabbits.

2.C.4.g. Snowshoe Hare

The snowshoe hare is present in and dependent upon the mixed conifer-aspen vegetation habitat year round. This habitat type is limited in the mine operations areas of disturbance and the proposed actions will do little to harm the habitat type and the dependent hare populations. Although the sensitive period for reproduction is from April 1 to August 15, there will be no serious long term impact on the snowshoe hare and there will be little change in population. Subsidence will not harm the above ground dweller as it potentially could the subterranenan inhabitants. Hunting will be the most influential activity of man upon snowshoe hares but there should not be much difference from prior years and no long-term impact.

2.C.4.h. Furbearers

Limited portions of the mine and adjacent areas provide substantial value habitats for a few species categorized by management agencies as furbearers: ermine, long-tealed weasel, badger, and the striped skunk. Obviously, the breeding and rearing activities of these nonmigratory species occurs within the proposed impact area and their dens and burrow systems are important to maintenance of their populations; however, it is highly unlikely that there will be any serious long term impact created by the proposed actions of this specific projet. After subsidence occurs, new burrows will be built or old ones reconstructed. These species are widespread and adaptable to the activities of man.

2.C.4.i. Small Mammals

Although small mammals do not qualify individually as high interest species, they represent a significant part of the ecosystem. The majority are herbivores and are the primary source of food for higher trophic levels, particularly raptorial birds, canids, and felids. This trophic importance warrants consideration. Since this mining project only involves the expansion of an ongoing operation, there will be little habitat loss due to construction and operation of additional surface facilities. Therefore, subsidence and its impact on underground burrow systems is the primary concern. The potential exists for caving in burrows and/or changing burrow continuity due to fracturing of the

strata. Although this would temporarily alter the population density and age structure, recovery would be imminent and rapid since the breeding population contiguous and within the localized area of impact would not be lost. Additionally, the population densities are more than adequate to supply the limited number of predators present, particularly raptorial birds, that utilize the resource.

No population density studies have been conducted since 1981, but visual observations have been an ongoing practice at PMC. Populations of ground burrowing squirrels and marmots have grown significantly in areas where interim revegetation has been conducted. The highly visible marmots in particular have spread from only one known location to now utilize the entire road from the 7200 foot elevation to the mine site and the old No. 1 Mine Road. The cuts and fills made while constructing the roads has obviously provided excellent burrowing areas and the associated vegetation planted by PMC has provided a ready source of food for the expanded population.

2.D. Birds

2.D.1. Methodology

A review of literature on birds was conducted using a computer data program and available publications on bird distribution. One trip was made to the Unit Train and Refuse Pile Expansion Area site in November, 1980; one trip was made to the Unit Train and Refuse Pile Expansion Area and the Seeley Canyon Breakout areas in June, 1981; one trip was made to the Unit Train, Seeley Canyon and Gentry Mountain Shaft areas in July, 1981. The Corner Canyon Fan Breakout Area was surveyed in July, 1982.

The proposed Seeley Canyon Breakout did not take place because of underground mining conditions. Instead, a breakout location in Corner Canyon was selected. This area was covered by permitting work including birds and will be addressed later in this section.

Meetings were held to get agency input into the bird investigations at PMC. The following were contacted or were met with: James Bates and Charles Greenwood (Wildlife Biologists - UDWR), Don Ward (Wildlife Biologist - U.S. Forest Service), Clark Johnson (USFWS).

Raptor surveys were conducted in 1981 and 1982 in the Corner Canyon area, as well as the entire permit area. Raptor surveys have been conducted yearly since 1982 in conjunction with the UDWR and the USFWS.

2.D.2. Bird Resources

According to information prepared by the UDWR, the mine plan area is represented by the Transition and Canadian Life zones. In this area the UDWR states that there is a potential for 242 bird species in the area.

The summary of habitats present in the mine plan area include parklands, riparian (very limited), cliffs and tallus, sagebrush, pinyon-juniper forest, shrubland, aspen forest, and spruce-fir forest. A more detailed account of these habitats is contained in Exhibit 12, Fish and Wildlife Resource Information (p. 6-7).

Bird species found in the impact area are listed in Table 1 of Exhibit 13, Report on the Birds of the Proposed Mining Development Plan.

The Unit Train and Refuse Pile Expansion Area is represented by cliffs and tallus (very limited), sagebrush, and pinyon-juniper. In this habitat, the typical arid desert species are represented. The only exception is the small riparian situation associated with sediment ponds on the area.

Two species of involved birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). However, there are no known nesting sites for the peregrine falcon in this area. Because of the suspected transient nature of these birds, no problems are foreseen with the projected development of the mine facilities.

2.D.2.a. Unit Train and Refuse (Waste) Pile Extension Areas

Unit Train and Refuse Pile Expansion Area is the largest area of potential impact. The site is approximately 70 acres in size. It is also the area which would sustain the greatest impact to birds. The area is covered primarily with pinyon-juniper trees, sagebrush and rabbit brush. Some of the side canyons also contain large conifers; basically it is a high, dry desert environment. Some game birds may be on the site, but their numbers are extremely limited.

Although some impact may occur to other birds and the proposed Unit Train area, no serious impacts of any kind are anticipated because of the large amount of area in Carbon County of this same habitat type and the status of the birds involved. Continued monitoring activities of raptors in the area will document any impacts to nesting raptors.

The Gentry Mountain Shaft Area is an open parkland area with no potential nesting areas for many species of birds. However, species such as the Vesper sparrow, mountain bluebird, and other open area nesting species are common here. Adjacent areas provide conifer and aspen nesting sites

for many birds. The impact on birds in this area is thought to be of little consequence.

2.D.2.b. Corner Canyon

Corner Canyon site was examined in July of 1982 in order to obtain field data for this report.

Two species of involved birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). However, there are no known nesting sites for the peregrine falcon in this area. Because of the suspected transient nature of these birds, no problems are foreseen with the projected development.

Potential areas of impact are pointed out and marked on Figure 10-1 of Exhibit 11, An Inventory of the Terrestrial Wildlife of Corner Canyon. This only involves a very small area in aspen habitat in Corner Canyon. Forbs and grass make up the ground cover in this area. A list of birds likely to be found in the area is included in Table 10-3 of Exhibit 11, An Inventory of the Terrestrial Wildlife of Corner Canyon.

2.D.2.c. Gentry Mountain Shaft Area

The Gentry Mountain shaft area is both described as having spruce, fir, and aspen trees with a ground cover of grass and forbs. A theoretical list of birds, except for the raptors, is included as Table 2 of Exhibit 13, Report on the Birds of the Proposed Mining Development Plan Submitted by the Plateau Mining Company.

2.D.3. Birds of High Interest

The UDWR has requested that the issue of "critical habitat" be addressed as it relates to certain birds of "high interest". The only "high interest" birds thought to be found in the proposal area are:

2.D.3.a. Bald Eagle

The bald eagle is a rare, winter resident of this region of Utah, but no nesting of the bird is known to occur in the State of Utah. There is a remote possibility that trees in the proposal area would be utilized for roosting.

2.D.3.b. Golden Eagle

The golden eagle is a year-round resident in the vicinity of the applicant's operations. Annual raptor surveys have been conducted since 1982 in conjunction with the UDRW. Map 37, Wildlife Land Use Map, shows locations of raptor nest sites. Table 54, Raptor Nest Sites Activity, lists nest sites and nesting activity since 1982. Table 54 shows nest activity in accordance with USFWS and UDWR procedures. Nests that were "tended" or "maintained" i.e., that had fresh greenery in them, are listed as active.

Until 1986, little success in hatching by raptors is assumed since no young birds were observed in nests. Several nests were obviously tended as evidenced by fresh greenery in the nests. Unless the birds hatched and fledged unusually early, there was no success in any of the nests observed from 1982 through 1985.

In June, 1986, two golden eagle nests were observed containing 3 young birds. (Site 14 - 2 young, Site 20 - 1 young).

2.D.3.c. Peregrine Falcon

The peregrine falcon is a year-round resident in southeastern Utah; however, this bird is not known to nest anywhere in the vicinity of the applicant's operations.

2.D.3.d. Prairie Falcon

The prairie falcon is a year-round resident in the vicinity of the applicant's operations. One nest site (No. 2) was located in the cliffs in the northwest ¼ of Section 3, T15S, R8E.

This nest site has been active in 1982, 1984, 1985 and 1986, but it is not known how successful fledging has been.

2.D.3.e. Ferruginous Hawk

This hawk is thought to be uncommon in the permit area. Nesting of this hawk usually occurs at lower elevations.

2.D.3.f. Merlin (Pigeon Hawk)

This falcon is thought to be rare in this area; however, the UDWR lists it as a potential winter resident of the permit area.

2.D.3.g. Spotted Owl

Little is known about this species of owl. It is known to inhabit canyon areas and to occur in this part of Utah. Because it is a nocturnal species, it was not found during the field survey.

2.D.3.h. Flammulated Owl

This owl is found state-wide in Utah. Because of its nocturnal habits, no information is available for the permit area.

2.D.3.i. Williamson's Sapsucker

This species is an uncommon, summer resident in the permit area. Its presence was not documented during the survey, but it is known to occur in this part of Utah.

2.D.3.j. Black Swift

The UDWR has documented the presence of this bird in areas adjacent to the applicant's operations; however, it was not observed in the permit area during the field survey. It is a cliff-nesting species and resembles the white-throated swift except that it is all black and thus, highly visible.

2.D.3.k. Western Bluebird

This species is a year-round resident of the permit area.

2.D.4. Electric Power Line Raptor-Proofing

Since 1977, power lines constructed by PMC have been designed to be raptor-proof. In 1981, the UDWR inspected all power poles owned by PMC for evidence of use and evidence of bird electrocutions. Poles in logical locations of eagle usage showed no evidence of either usage or electrocutions. The UDWR requested the USFWS to inspect PMC's poles, which they did during the week of August 24-28, 1981. The USFWS in a letter to Cleon B. Feight, Director of the DOGM on October 9, 1981 stated: "The Plateau Mining Company lines were examined for the Star Point Mine. Its lines do not pose a threat to raptors." Copies of correspondence related to this subject can be found in Exhibit 14, Wildlife Correspondence.

Photographs of newly constructed power poles for the Unit Train facility can be seen in Exhibit 15, Mine Structure Photographs. As can be seen, a triangular "Bird Deflector" has been incorporated into the construction on the side of the cross-arm holding the close wires. This deflector prevents large birds, such as eagles from landing on the cross arms, thus preventing electrocution.

According to the USFWS, the likelihood of eagles using power poles in the mine area is very remote because the birds prefer to perch on dead trees, on the higher canyon sides, and in the sagebrush valleys away from mine activity. This is evidenced by no signs, droppings, prey carcasses, or electrocuted birds below any poles on the PMC Permit Area.

2.D.5. Environmental Consequences

Some impact will occur at the Unit Train and Refuse Pile Expansion area. However, because of the large amount of area in Carbon County of this same habitat type and the status of the birds involved, no serious impacts of any kind are anticipated.

The Corner Canyon Fan Breakout, the Gentry Mountain Shaft and the Mudwater Canyon Fan Breakout areas comprise very small disturbances and as such will not have negative impacts on birds.

No active raptor nest sites are within one half mile of mining activities. Two old stick nest sites (No. 5 and 6) as shown on Map 37, Wildlife Land Use Map, are located in close proximity to mining operations. These nest sites appeared old and unused in 1978 when the access road immediately above them was constructed.

2.E. Reptiles and Amphibians

The material used in this portion of the report was derived from literature obtained from Utah State University's data retrieval program.

Increasing elevation rapidly reduces the number and kind of reptiles and amphibians. In Utah, the more northern latitude reduces numbers of reptiles and amphibians in much the same way as does the increase in elevation.

The geographical and associated climatic factors have eliminated most desert species, leaving species that are adapted either to mountain habitats or montane type habitats developed in the more northern areas. Thus, the reptiles and amphibians of Utah, and particularly those inhabiting the area under consideration, have arrived in Utah by means of dispersal lanes coming from the northeast and the southeast. With few exceptions, the species listed have side distributions and are versatile in their adaptive abilities.

Literature pertaining to the amphibians and reptiles is extensive, but much of it refers to species occurring in the desert areas and has only limited reference to forms inhabiting high elevations in Utah. Most of

No active raptor nest sites are within one half mile of mining activities. Two old stick nest sites (No. 5 and 6) as shown on Map 37, Wildlife Land Use Map, are located in close proximity to mining operations. These nest sites appeared old and unused in 1978 when the access road immediately above them was constructed.

Underground mining in Section 18, T15S, R8E may cause subsidence which may affect the sandstone cliff face where two golden eagle nests exist (Nos. 20 and 21). No data on the effects to cliff faces and nests are available to indicate possible disturbance. These nests will be addressed in response to Section 784.21, Fish and Wildlife Plan.

2.E. Reptiles and Amphibians

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Literature pertaining to the amphibians and reptiles is extensive, but much of it refers to species occurring in the desert areas and has only limited reference to forms inhabiting high elevations in Utah. Most of

the publications dealing with species lists for the state are old. The most up-to-date listing for the area under consideration may well be a checklist of Utah amphibians and reptiles (Tanner, 1975), and UDWR Publication No. 78-16 (Dalton, 1978) which references a contiguous and similar geographic area.

2.E.1. Reptiles

Based on a review of the literature, it was determined that probably 12 species of reptiles (Table 49, Species List and Classification of Reptiles Whose Published Ranges Overlap the Expansion Area of Plateau Mining Company) occupy the mine plan area; this area is considered to be a substantial value habitat for all species. All reptiles have some protection under the Utah code, but since the species listed are all widespread throughout similar habitats in Utah, none are treated as high interest species and, therefore, are not individually discussed.

2.E.2. Amphibians

Based on the literature review, it was determined that probably three species of amphibians (Table 50, Species List and Classification of Amphibians Whose Published Ranges Overlap the Mine Area of Plateau Mining Company) inhabit the proposed area of concern which provides substantial value habitat for the three species listed. All amphibians are legally protected in Utah, but since the species listed are all widespread throughout similar habitats in Utah, none are treated as high interest species, and, therefore, are not individually discussed.

2.F. Aquatic Resources

The permit area includes the headwaters of 2 small perennial streams - Miller and Tie Fork Creeks. Other streams in the immediate permit area are intermittent (dry at least part of most years) and of low water quality. No surface waters in the permit area are considered as important game fisheries resources by the UDWR. Tie Fork Creek is important as a tributary to a quality trout stream, Huntington Creek.

The following aquatic resource descriptions address: 1) Miller Creek using information from a 1976 study (Southeast Association of Governments, 208 water quality study, by Vaughn Hansen Associates) and a 1979 study (USBLM water quality study of the EMRIA fossil fuel lease lands, by GeoScientific); and 2) Tie Fork Creek using information from a 1971 survey (UP&L Company Huntington Canyon Generating Station impact study, by BYU Aquatic Ecology Laboratory) and surveys conducted in 1980, 1981 and 1982.

Water quality, physical habitat and stream biota are all important components of aquatic resources.

Water quality and hydrology are discussed in more detail in another chapter. In this chapter resource quality is based mainly upon aquatic macroinvertebrate community data with water quality and habitat descriptions used in a supporting role. Additional information is contained in Exhibit 16, Aquatic Resources of Plateau Mine Permit Area.

2.F.1. Methodology

2.F.1.a. Miller Creek

The aquatic resource description of Miller Creek consists of a review of available information from previous surveys. Water quality determinations were conducted by certified Laboratories (Ford Chemical and BYU Environmental Analysis Laboratories). Biological samples were taken (1976 and 1979) with a modified Surber sampler according to standard methods (stratified random method, EPA, 1973). Analyses of data were made by the Aquatic Ecology Laboratory under the direction of Dr. Robert N. Winget, Department of Zoology, Brigham Young University.

2.F.1.b. Tie Fork Creek

Macroinvertebrate samples were taken using a Surber sampler (Surber 1937) modified by Winget in 1971 (Reichert 1976). The modified sampler

was designed with a larger collecting bag to prevent excessive backwash and loss of contents when collecting in deep, swift streams. Sample points were selected in each stream so as to obtain maximum information while minimizing sample variance. The stratified random method described by Weber (1973) in which environmental variance is minimized by selecting for only one habitat type to take samples from was used.

Samples were taken during spring and fall because they appear to have less variability from year to year than do summer samples. Samples were processed by the Aquatic Ecology Laboratory, Department of Zoology, Brigham Young University.

Tie Fork Creek is the combination of Gentry Hollow and Wild Cattle Hollow Forks. Impacts on either fork should show up as impacts on the aquatic community of Tie Fork Creek below their confluence, thus Station TF-01 (Figure 1 of Exhibit 17, Aquatic Resource Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollow), was selected for the main stream and Stations TF-WCH (Wild Cattle Hollow above confluence with Tie Fork Creek) and TF-GH (Gentry Hollow above confluence with Tie Fork Creek) were chosen to obtain baseline data for both of the tributary streams.

A detailed explanation of methodologies is included in Exhibit 16, Aquatic Resources of Plateau Mine Permit Area, and 17, Aquatic Resources Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollow.

2.F.2. Existing Aquatic Resources

2.F.2.a. Miller Creek

Miller Creek below Hiawatha has a wide stream channel (mean width 23 ft) and on 8 April 1976 water width was only 8 feet with a mean depth of less than 0.3 ft. Stream substrates were relatively evenly distributed over

rubble, gravel, sand and silt. There was a considerable amount of coal dust evident in the substrate materials. Stream banks were moderately stable with sparse willow and grass cover.

Water quality in Miller Creek was very poor in 1976 and 1979 with TDS ranging from 2,000 to over 6,000 mg/l. Sulfate levels ranged from 1,100 to over 3,800 mg/l. Dissolved oxygen was always high but BOD was from 1 to 2 mg/l, oxygen was maintained by turbulence of the water. The high levels of dissolved solids comes from the Mancos Shale formations at the stream source and along a considerable portion of its reach. Ammonia nitrogen was present on several occasions in excess of 7 mg/l. During 1976 nitrate nitrogen levels ranged from 0.4 to 1.4 mg/l N and phosphorous levels in the form of ortho-phosphorous were as high as 0.2 mg/l. This coupled with high levels of total and fecal coliform bacteria (greater than 1,000 and >70 MPN/100ml, respectively) indicated a strong source of organic pollution tied in closely to fecal contamination. In 1979 there was less evidence of organic pollution in Miller Creek -lower numbers of bacteria.

2.F.2.a.1. Station MC1.

Mactoinvertebrate samples taken on 8 April 1976 showed an extremely high dominance by chironomid midge larvae with numbers of 11,800/m^2 (Table 1 of Exhibit 16, Aquatic Resources of Plateau Mine Permit Area). The next dominant form was oligochaete worms, at 344/m^2. The community at this station was definitely under heavy stress.

In August 1979 there were 12 taxa of aquatic macroinvertebrates collected (Table 1 of Exhibit 16, Aquatic Resources of Plateau Mine Permit Area), all tolerant to sedimentation and moderately poor water quality. Chironomids were the dominant taxa collected as during 1976 but the low numbers indicated less organic enrichment in 1979 or some physical factor(s) was limiting the numbers of macroinvertebrates.

This stream section has historically been under both water quality and habitat stress from natural as well as man caused factors. Potential for

improvement is almost non-existent due to the extensive Mancos Shale and related formations of the area and limited water resources.

2.F.2.a.2. Station MC2.

Miller Creek at Wattis Bridge had 16 taxa of aquatic macroinvertebrates in samples collected August 1979 (Table 1 of Exhibit 16, Aquatic Resources of Plateau Mine Permit Area). All of the taxa sampled are tolerant to sedimentation and moderate to poor water quality. The mean number/m^2 was only 847 which is quite low even for a small stream. This indicates that this stream has been under stress probably from low flows in the summer/fall/winter, scouring spring flows, sedimentation, low gradient including low water velocity, and a lack of quality riffle habitat in most of the stream. This was indicated by the presence of stratiomyids, ceratopogonids and oligochaetes. Compared with Station MC1, this station was somewhat better biologically speaking but still poor quality.

2.F.2.a.3. Station MC3.

The aquatic macroinvertebrate samples taken from this station on 8 April 1976 had approximately equal dominance by oligochaete worms and chironomid midge larvae, together comprising over 88% of the total number (Table 1 of Exhibit 16, Aquatic Resources of Plateau Mine Permit Area). The mayfly Baetis was next in abundance. Dominance by any of these 3 taxa is indicative of a stressed situation and their high numbers would indicate heavy organic enrichment as well as a significant siltation of the stream.

This station, like the lower stations on Miller Creek has been, and still is, under stress from both poor water quality and habitat.

2.F.2.b. Tie Fork Creek

Historically, Tie Fork drainage has been under heavy grazing impacts. Tie Fork Creek in the region of the confluence of Gentry and Wild Cattle Hollow shows signs of habitat stress - steep stream banks with sloughing

of bank materials common. Stream banks in some areas are as high as 30 to 40 feet vertical with no vegetative cover. Unstable stream banks are devastating to small streams such as Tie Fork and its tributaries where flow range from lows of less than 1 cfs to over 50 cfs during storm occurrences or spring runoff. With heavy chemical deposition, Tie Fork Creek probably has never been important to spawning fish but it has been, and still is, an important producer of fish food organisms for Huntington Creek.

The macroinvertebrate communities of Gentry Hollow and Wild Cattle Hollow are significantly different and each will be discussed separately.

In Gentry Hollow Baetis and chironomidae dominated the community in the spring and fall samples of both years, dominance greater in October (see Table 4 of Exhibit 17, Aquatic Resources Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollows). These two taxa often dominate communities subject to frequent physical environmental stress such as spring scouring and fall-winter low flows. Due to the steep gradient in Gentry Hollow the bottom of the stream remains free from silt. Water quality at this station is high and water temperatures remain low throughout the year due to high elevation and good stream riparian vegetative cover. The stream's high water and habitat quality are reflected in the presence of Brachycentrus americanus and Micrasema caddisflies (TQ values 24, 24, respectively) and the stoneflies, Amphinemura, Megarcys signata, and Diura knowltoni, (TQ's = 6, 24, 24, respectively). The presence of Parapsyche (TQ = 6) and Neothremma (TQ = 8) caddisflies indicate that this is a high quality, cool, headwater stream.

The macroinvertebrate community showed a degradation trend in 1981 similar to that seen in Tie Fork Creek below the confluence of Gentry and Wild Cattle Hollows. The BCI was 89 in May of 1981 and then dropped to 83

in October. In 1982 it had dropped even further to only 70 by June but recovery had begun by October as evidenced by a return of the BCI to 89.

2.F.2.c. Wild Cattle Hollow

The macroinvertebrate community in Gentry Hollow was very similar to the communities of Wild Cattle Hollow and Tie Fork and was dominated by Baetis and chironomidae with the dominance greater in October than May or June (Table 5 of Exhibit 17, Aquatic Resources Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollows). The impact from the low flows of 1981 are evident wiht the BCI dropping from 82 in May 1981, to 80 by October of the same year and down to 77 by June 1982. The increase to 90 by October 1982, again shows the recovery process in operation.

2.F.3. Environmental Consequences

2.F.3.a. Miller Creek

Miller Creek historically has experienced poor water quality conditions and because of this is of no use as a fishery and is of little value to aquatic resources in the area. Water source investigations completed in July of 1986 indicate a significant contribution of water as base flow originating from the Star Point Sandstone and Blackhawk Formations which contain tongues of Mancos Shale. The Mancos is notoriously bad for causing severe degredation of water quality. In this case significant degredation of water quality occurs in the Right Fork Stream with the inflow from the Star Point and Blackhawk Formations.

There has been no degredation of the quantity or quality of the water in Miller Creek because of PMC operations. No surface disturbance in the Miller Creek drainage basin exists except for some subsidence cracks high up on the ridges to the north of the stream. There are no springs or streams initiating from the areas of subsidence to influence the stream.

2.F.3.b. Tie Fork Creek

Water quantity and quality monitoring in both tributary streams feeding Tie Fork Creek over the past five years show no impacts from mining conducted by PMC. No surface disturbances exist in the drainage basins for either tributary.

Subsidence monitoring above the longwall panels indicate uniform subsidence with no surface disturbances on Hoag Ridge which is contributory to the Gentry Hollow Stream. Based on this, no effects are expected on Wild Cattle Hollow Stream, or the Gentry Hollow Stream when mining extends across the graben to Gentry Ridge.

In Exhibit 17, Aquatic Resources Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollows, Robert Winget our Aquatics consultant expressed concern that subsidence could cause a reduction in total flow of Tie Fork Creek. Based on data to date, no effects have been seen of subsidence either on spring flows or stream flows in the area. Continued spring and stream monitoring will document any changes to water quality or quantity affecting aquatic resources.

2.G. Threatened or Endangered Species

There are no endangered or threatened species of mammals in the mine plan area, nor are there any in proximity close enough to be considered (Figure 19, Endangered Mammalian Species in Relation to Proposed Impact Area).

Two species of involved birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). However, there are no known nesting sites for the peregrine falcon in this area. Because of the suspected transient nature of these birds, no problems are foreseen with the projected development of the mine facilities.

Mining in Section 18, T15S, R8E may cause subsidence in the upper reach of the North Fork of the Right Fork of Miller Creek.

A prediction of subsidence from longwall mining in Section 18 with associated impacts was prepared by J.F.T. Agapito and Associates and is presented in Exhibit 30, Prediction of Subsidence Due to Two-Seam Longwall Mining in Section 18. As discussed in response to UMC 784.14(c) on page 784.94a, impacts to base flow conditions in Miller Creek due to the interception of groundwater within the mine are estimated to be five gpm or less.

CPMC proposes to mine beneath the stream using longwall methods in conjunction with a U.S. Geological Survey study to determine the following: (1) To determine the effects of longwall mining and resulting subsidence on overlying groundwater and surface-water environments in an area where the thickness of the overburden is less than 1000 feet; and (2) To develop methods of determining the hydrologic effects of mining-related land subsidence. The relation between the hydrologic effects of subsidence and certain geologic parameters will be included in the study. These parameters include the variable thickness, strength, stratigraphy, and lithologic character of the rocks overlying the mined areas; the orientation and density of pre-existing joints; and the proximity and principal strike direction of faults. Documenting the impact on certain hydrologic properties, such as water levels in perched aquifers, water-level gradient in regional aquifers, chemical quality of groundwater in these aquifers, stream flow quantity and quality, and spring discharge quantity and quality, will be included in the evaluation. A complete project proposal for the USGS study is shown as Exhibit 53, Hydrologic Response to Land Subsidence Caused by Underground Coal Mining, Miller Creek Drainage, Carbon County, Utah.

A complete discussion of mining beneath the stream can be found starting on page 784-62a.

AMENDMENT TO
APPROVED Mining & Reclamation Plan
Approved, Division of Oil, Gas & Mining

by _____ date 1-11-89

2.F.3.b. Tie Fork Creek

Water quantity and quality monitoring in both tributary streams feeding Tie Fork Creek over the past five years show no impacts from mining conducted by CPMC. No surface disturbances exist in the drainage basins for either tributary.

Subsidence monitoring above the longwall panels indicate uniform subsidence with no surface disturbances on Hoag Ridge which is contributory to the Gentry Hollow Stream. Based on this, no effects are expected on Wild Cattle Hollow Stream, or the Gentry Hollow Stream when mining extends across the graben to Gentry Ridge.

In Exhibit 17, Aquatic Resources Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollows, Robert Winget our

There are no endangered or threatened species of amphibians or reptiles in the mine plan area.

Official U.S. Fish and Wildlife Service (USFWS) Section 7 opinions relating to the aquatic resources of Huntington and Eccles Canyon drainages have indicated that no threatened or endangered species of fish or other aquatic organisms have been found in waters upstream of the lowest 2 or 3 miles of the Price or San Rafael Rivers.

2.H. Overland Conveyors And Mule Deer Movement

In 1981, DOGM personnel became concerned with the overland conveyor running from the mine to the preparation plant. PMC committed to maintaining adequate clearance beneath the conveyor for mule deer to cross. Adequate clearance at the time was unknown; therefore the UDWR conducted a study of this conveyor to document deer crossings and to study the effect of various clearances upon deer crossing, a copy of the study results are included in Exhibit 18, Mule Deer Passage Beneath an Overland Coal Conveyor.

Briefly, deer seemed to prefer areas of 50 to 90 centimeters clearance and one deer actually crossed with only 33 centimeters of clearance. Deer were observed crossing beneath the conveyor during the day, during the night, with the conveyor belt in motion and with the conveyor belt stopped. Some deer showed some anxiety in crossing while others did not.

It has been the experience of personnel at PMC that mule deer are very adaptable to human presence; even to the extent of becoming curious about mans activity.

The UDWR is now recommending that overland conveyors be constructed with 60-70 percent of the structure elevated a minimum of one meter to allow deer to cross. Conveyors constructed for the Unit Train facilities in 1985 and 1986 have been constructed using this recommendation; the actual mean height would be greatly higher than one meter since the conveyors are elevated on high towers throughout most of their length.

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*UMC 783.21 SOIL RESOURCES INFORMATION

*(a) THE APPLICANT SHALL PROVIDE ADEQUATE SOIL SURVEY INFORMATION ON THOSE PORTIONS OF THE PERMIT AREA TO BE AFFECTED BY SURFACE OPERATIONS OR FACILITIES CONSISTING OF THE FOLLOWING:

*(1) A MAP DELINEATING DIFFERENT SOILS;

RESPONSE:

Mapping

Various soil surveys have been conducted within the boundaries of the PMC Permit Area. The Soil Conservation Service (SCS) initially surveyed all private and public domain lands east of the forest boundary in 1978, 1979 and 1980. This survey was conducted at an Order III survey level. Not all areas could be mapped in their undisturbed state at this date, but due to the level of survey, it was possible to extrapolate the soil map units to previously disturbed areas.

In 1980, PMC commissioned Endangered Plant Studies, Inc. of Orem, Utah to conduct a detailed Order I survey of areas adjacent to the Refuse Pile Expansion Area, the proposed Unit Train Loadout Site and the proposed Gentry Mountain Shaft Site. These surveys were completed in 1981 and incorporated existing SCS data into this more detailed inventory. Results from these two survey efforts were originally submitted in

Chapter 8 - Soil Resources of the Star Point Mines Permit No. ACT/007/006. Results obtained from SCS soil mapping efforts initiated in 1978 and continued through 1980 and the EPS soil mapping completed in 1981 are presented in Exhibit 19, Soils Information. In 1982, PMC complying with permit topsoil concerns, associated with the Refuse Pile Expansion Area and the Corner Canyon Breakout, hired Dr. Al Southard, Professor of Soil Science at Utah State University and a Master's level graduate student, Mr. Scott Lowe to oversee topsoil removal activities and soil mapping for the Corner Canyon Breakout Fan Site. At the proposed Corner Canyon Fan Site two pits were dug and a detailed profile characterization of each respective diagnostic horizon was performed. The soil mapping information obtained from this 1982 mapping effort is presented in Exhibit 19, Soils Information. Following this qualitative characterization, DOGM requested that PMC dig 17 soil pits in August of 1983 to quantify topsoil thickness on this tract. Profile summaries of these 17 soil pits are presented in Table 55, Corner Canyon Fan Site Soil Pit Profiles. Ultimate total disturbance for the Fan in Corner Canyon amounted to 0.44 acres and this level of survey far surpasses the normal requirements for the typical Order I soil survey. This mapping was originally submitted by PMC in its Corner Canyon Permit Application and subsequently approved by DOGM.

In 1983, PMC initiated field work associated with the Unit Train Loadout and associated conveyor. This small area was originally mapped by the SCS in 1979 and subsequent sampling of the nearly 8 acre tract with nearly one sample hole per acre, more than surpassed the usual intensity associated with the Order 1 survey intensity. Soil profile descriptions for this area are presented in Exhibit 19, Soils Information. Soils mapping unit descriptions for these soils are presented in the same exhibit.

The soil survey on lands located within PMC Permit Area lying within the Manti-La Sal National Forest was completed by Swensen and others (1983) and by U.S. Forest Service (USFS) Soils Scientists in 1984-1986. This survey was completed at a high intensity Order III level of survey. The USFS soils mapping work for those portions of the PMC Permit Area lying

within the national forest are presented in Exhibit 19, Soils Information.

The results from all of these respective surveys have been integrated into current mapping (Map 38, Permit Area Soils) and are presented in this permit application in order to consolidate all of the information previously collected that pertains to the PMC Permit Area. As suggested in the DOGM "Guidelines for Preparation of a Topsoil Management Plan" the location of each sampling point that could be documented was marked on Map 38, Permit Area Soils. Over 15 additional samples and pits are known to have been dug by the SCS and PMC, but since their exact location could not be located, they were not marked on the maps or used in this discussion. The locations of all related surface facilities are shown on the maps. All existing topsoil and subsoil stockpiles are also shown.

A general permit area soils map at a scale of 1:1200 shows the extent of all mapped soils units within the PMC Permit Boundary (Map 38, Permit Area Soils). Table 56, Permit Area Soil Types, presents the acreages for each soil type encountered on the property. All disturbed areas within the permit area were mapped at a scale of 1:4800. The extent of disturbed areas within the mine permit area are presented on Map 39, Disturbed Area Soils (3 sheets): Map 40, Gentry Mountain Shaft Site Soils; and Map 41, Corner Canyon Fan Site Soils. Acreage associated with the disturbed area are listed in Table 57, Disturbed Area Soil Acreages.

(2) SOIL IDENTIFICATION;

RESPONSE:

As explained earlier, the basis for all soils mapping work done in this area is the manuscript SCS Soil Survey for Carbon County. All subsequent soils work done within the PMC Permit Area was conducted in accordance with procedures utilized in the National Cooperative SCS Soil Survey Standards and DOGM Guidelines. All soils mapping units were correlated to the accepted standards for soils mapping units established by the SCS and known to occur in the specific area. Whenever profiles were dug that

correlated to a specific series or phase, then the information was entered whenever the profile was thought to correlate to a certain series or phase, but if there were questions a tentative correlation was made. In the Corner Canyon Fan Site and Gentry Mountain Shaft Sites mapped prior to formal USFS mapping in the area, the soils were classified according to their taxonomic names. Since the USFS mapping followed this same practice, there is no discontinuity in the mapping. Also, the SCS mapped soils series names and the USFS mapped according to the taxonomic nomenclature. This difference causes no confusion, once it is understood that the forest boundary forms and boundary between mapping symbols used by the SCS and USFS.

(3) SOIL DESCRIPTION; AND

RESPONSE:
Detailed soil mapping unit and soil profile descriptions for all mapped soils reported to occur within the PMC Mine Permit Area are presented in Exhibit 19, Soils Information. As can be readily observed, the SCS information for soil mapping units within this area are very accurate because in almost every instance, site specific profiles of permit area soils are included. PMC believes that this site specifically adds a great deal of reliability to the information presented.

(4) PRESENT AND POTENTIAL PRODUCTIVITY OF EXISTING SOILS.

RESPONSE:
As described in the response to UMC 783.22, mining activities have been conducted in the Wattis area since 1917. Due to this past history of mining, large areas were disturbed without topsoil salvaging operations being conducted. Areas that have been disturbed subsequent to the passage and implementation of the Surface Mining and Reclamation Control Act of 1977 and subsequent regulations and associated permits have had topsoil removal associated with these activities. The first topsoil removal activities conducted at PMC were associated with the construction of sedimentation ponds initiated in 1980. Therefore, from the initiation of mining activities in 1917 until PMC's permit was

initiated in 1980, no total removal was attempted. This point is presented to document that significant areas have been disturbed without topsoil salvage. These areas include the Lion Deck Portal Area and associated access roads. The Star Point Mine No. 1 complex and associated access roads, the overland conveyor from the Lion Deck to the wash Plant, the entire Wash Plant and lower office complex, the majority of the Refuse Pile Area, the Mudwater Canyon Fan Site and other miscellaneous areas. The only areas disturbed subsequent to the requirement to salvage topsoil include the Refuse Expansion Area, the Unit Train Loadout conveyor, the Corner Canyon Fan Site and certain sedimentation ponds. The results of the field investigations and laboratory data collected from the areas wherein topsoil was salvaged are described in the response to UMC 784.

The chemical and physical properties of plant growth materials have been intensively investigated by PMC since the issue of revegetation potential became a regulatory concern. The properties of undisturbed topsoils potentially suitable for reclamation have been thoroughly evaluated in response to various permitting stipulations issued between 1981 and 1985. Information on all known chemical and physical data collected within the current PMC Permit Area were recently submitted to DOGM in permitting actions associated with the Unit Train Loadout. This submittal dated May 21, 1985 was submitted in response to DOGM stipulation UMC 817.24-1-TLP Item #3 dated March 28, 1985. The current submittal contains all of the data in the previously mentioned submittal with the exception of the Seely Canyon Breakout and original Unit Train Loadout soils data. No disturbance was ever made in these areas and therefore these samples are not directly applicable towards characterization of the soil resource with respect to its reclamation potential. The current submittal, in addition, contains numerous other chemical and physical analyses, that were not known to be available until discovered in research associated with the current permitting effort.

The current submittal contains the results of 120 tests that have been completed on PMC's mine area to quantify the suitability of the soil resoruce. Counting the previously cited submission and the samples

collected within the PMC Permit Area for the Seely Canyon and original Unit Train Loadout Area, which are not included in the current submittal, approximately 150 soil samples have been analyzed to describe their chemical and physical properties. Relevant data for specific portions of the mine area that will ultimately require reclamation are described below. Soil properties of the Mine No. 1 Area are contained in Table 58, Star Point Mine No. 1 Soil Properties. Soils properties in the Refuse Expansion Area are described in Table 59, Refuse Expansion Area Soil Analysis. The chemical and physical properties of soils along the Lion Deck Portal Access Road are found in Table 60, Lion Deck Access Road Soil Samples and in Table 61, Chemical and Physical Analyses of Cut and Fill Areas. The later table also describes the soil resource along the Lion Deck Portal Conveyor and Unit Train Loadout Conveyor. The chemical and physical properties of soils at the Corner Canyon Fan Site are described in Table 62, Corner Canyon Breakout Soil Properties. The soils associated with the Unit Train Loadout Area are quantified in Table 63, Unit Train Loadout Topsoil Analysis. The characteristics of the coal refuse are described in Table 64, Coal Refuse Analysis. The soils in the vicinity of the proposed Gentry Mountain Shaft Site are described in Table 65, Proposed Gentry Mountain Shaft Location Soils Properties.

Examination of this data indicates that no toxic or acid forming materials have ever been found at PMC's mine site. The geologic materials not containing diagnostic soil horizons are in almost all respects as suitable as a plant growth medium as are the developed soils. Prior reclamation success has substantiated the fact that areas disturbed without topsoil salvage can be successfully reclaimed to meet current DOGM reclamation criteria. Sufficient evidence is available to quantify that the coal refuse material is not acid or toxic forming as defined in UMC 700.5 and therefore does not need to have four feet of buffer material applied prior to topsoiling. Given the available data PMC requests that DOGM concur with this position.

(b) WHERE THE APPLICANT PROPOSES TO USE SELECTED OVERBURDEN MATERIALS AS A SUPPLEMENT OR SUBSTITUTE FOR TOPSOIL, THE APPLICATION SHALL PROVIDE RESULTS OF THE ANALYSES, TRIALS, AND TESTS REQUIRED UNDER UMC 817.22.

RESPONSE:

As can be readily observed in the soil mapping unit descriptions, numerous areas located within the PMC Permit Area do not possess developed diagnostic soil horizons containing topsoil as defined in UMC 700.5. The most noticeable include soil mapping units BY - Badland-Rubbleland Complex and the numerous Rock Outcrop encountered on the Lion Deck Access Road and Portal Areas. By regulatory definition, these areas do not contain "topsoil", but still possess plant growth media that are classified as a "good" topsoil substitute. PMC is not proposing that these areas be considered as either topsoil supplements or substitutes. PMC proposes to redistribute topsoil to all disturbed areas where topsoil was removed. Since topsoil was not salvaged from most areas to be reclaimed, it is reasonable to assume that the thickness of topsoil or replaced A horizon material may be less than what existed originally. Adequate site specific information is available to demonstrate the feasibility of reclaiming the disturbed areas with a combined thickness of approximately 17 inches of combined A and B horizon materials.

UMC 783.22 LAND-USE INFORMATION

(a) THE APPLICATION SHALL CONTAIN A STATEMENT OF THE CONDITION, CAPABILITY AND PRODUCTIVITY OF THE LAND WHICH WILL BE AFFECTED BY SURFACE OPERATIONS AND FACILITIES WITHIN THE PROPOSED PERMIT AREA, INCLUDING-

(1) A MAP AND SUPPORTING NARRATIVE OF THE USES OF THE LAND EXISTING AT THE TIME OF THE FILING OF THE APPLICATION. IF THE PREMINING USE OF THE LAND WAS CHANGED WITHIN 5 YEARS BEFORE THE ANTICIPATED DATE OF BEGINNING THE PROPOSED OPERATIONS, THE HISTORIC USE OF THE LAND SHALL ALSO BE DESCRIBED.

(2) A NARRATIVE OF LAND CAPABILITY AND PRODUCTIVITY, WHICH ANALYZES THE LAND-USE DESCRIPTION UNDER PARAGRAPH (A) OF THIS SECTION IN CONJUNCTION WITH OTHER ENVIRONMENTAL RESOURCES INFORMATION REQUIRED UNDER THIS PART. THE NARRATIVE SHALL PROVIDE ANALYSES OF:

(i) THE CAPABILITY OF THE LAND BEFORE ANY MINING TO SUPPORT A VARIETY OF USES, GIVING CONSIDERATION TO SOIL AND FOUNDATION CHARACTERISTICS, TOPOGRAPHY, VEGETATIVE COVER, AND THE HYDROLOGY OF THE AREA PROPOSED TO BE AFFECTED BY SURFACE OPERATIONS OR FACILITIES;

(ii) THE PRODUCTIVITY OF THE AREA PROPOSED TO BE AFFECTED BY SURFACE OPERATIONS AND FACILITIES BEFORE MINING, EXPRESSED AS AVERAGE YIELD OF FOOD, FIBER, FORAGE, OR WOOD PRODUCTS FROM SUCH LANDS OBTAINED UNDER HIGH LEVELS OF MANAGEMENT. THE PRODUCTIVITY SHALL BE DETERMINED BY YIELD DATA OR ESTIMATES FOR SIMILAR SITES BASED ON CURRENT DATA FROM THE U.S. DEPARTMENT OF AGRICULTURE, STATE AGRICULTURAL UNIVERSITIES OR APPROPRIATE STATE NATURAL RESOURCES OR AGRICULTURAL AGENCIES.

(b) THE APPLICATION SHALL STATE WHETHER THE PROPOSED MINE PLAN AREA HAS BEEN PREVIOUSLY MINED, AND, IF SO, THE FOLLOWING INFORMATION, IF AVAILABLE-

(1) THE TYPE OF MINING METHOD USED;

(2) THE COAL SEAMS OR OTHER MINERAL STRATA MINED;

(3) THE EXTENT OF COAL OR OTHER MINERALS REMOVED;

(4) THE APPROXIMATE DATES OF PAST MINING; AND

(5) THE USES OF THE LAND PRECEDING MINING.

(c) THE APPLICATION SHALL CONTAIN A DESCRIPTION OF THE EXISTING LAND USES AND LAND USE CLASSIFICATIONS UNDER LOCAL LAW, IF ANY, OF THE PROPOSED MINE PLAN AND ADJACENT AREAS.

RESPONSE:

The local, state, and federal managing authorities for areas within the permit boundaries are Carbon County, State of Utah, USFS and U. S. Bureau of Land Management (BLM).

The Carbon County zoning ordinance, amended February 15, 1977, with a revised zoning map dated 1974, zones the PMC property for recreation, forestry, and mining. Section 8-7-1 of the Carbon County zoning ordinance states:

> "Recreation, forestry, and mining zone has been established as a district in which the primary use of the land is for recreation, forestry, grazing, wildlife, and mining purpose. In general this zone . . . is characterized by . . . high grazing lands interspersed by ranches, recreational camps, and resource outdoor recreational facilities and mines and facilities related thereto".

The portion of the permit area within the Manti-La Sal National Forest is subject to the "Land Management Plan" of the USFS (1986). All of the permit area within the national forest is designated in the land management plan as "Coal Lands Management Area A". The management objectives related to the permit area, as set forth by the USFS in the

land management plan, are to improve and maintain watershed conditions, improve desirable plant species and vegetative cover, decrease soil erosion, maintain soil stability and productivity, coordinate mineral activities with other resource uses, manage and protect archaeological and paleontological resources, harvest timber and forest products on a sustained yield basis, provide quality recreational opportunities, coordinate transportation systems, and protect and maintain wildlife and fish habitats (USFS, 1979).

BLM planning under the "Management Framework Plans" for the Wattis unit states that all coal leases or permits must provide for minimizing or avoiding environmental damage and for rehabilitating lands affected by the operations. The land in the project area and adjacent areas is used for mining, cattle grazing, recreation, and forestry. Recreational uses consist primarily of hunting, camping, and picnicking. Past and present land uses of the project area and the region as a whole are discussed in the following sections. The source of much of this information is the Draft Environmental Statement: Development of Coal Resources in Central Utah (U. S. Geological Survey, 1978).

The Central Utah coal region encompasses lands in federal, state, county, and private ownership. Land use management plans for public and National Forest lands generally allow for mine and mine-related activities. Coal mining has been an integral part of the region's economy. Mining and related construction activity dominate employment in Carbon and Emery Counties. Active mining is going on in areas adjacent to the project area, and two new mines have been proposed within 25 miles of the permit area.

Historically, the livestock industry has been an integral part of the region's economy. Early settlers depended on range land for grazing sheep, cattle, and horses. As time passed, grazing operations became smaller, more numerous, and directly associated with small farms. Timber also has been tied to an integral part of the economy of the region, but on a much smaller scale than the livestock industry. Early settlers needed fence posts, corral poles, house logs, mine timber,

railroad ties, and lumber; numerous small sawmills supplied local needs. As time passed and needs diminished, most mills went out of business. No timber has been harvested for commercial purposes in the past 20 years.

Recreational use of the general region of the permit area consists of hunting, camping, and picnicking. Snowmobiling also occurs where the slopes are not too steep.

The PMC property and adjacent area is currently used for grazing, recreation, forestry, and coal mining. The majority of the surface under which PMC has federal leases is managed by the USFS under the multiple use and sustained yield concepts. Present management emphasizes livestock grazing and wildlife, timber, and watershed development. Land under state leases is used for grazing and access to the underground mining operations, including personnel and material supply and coal haulage from the underground mine to the preparation facilities. Coal preparation and management facilities are located on fee land.

USFS lands in Gentry Mountain Meadow and Castle Valley Ridge are grazed by cattle. Gentry Mountain Meadow is grazed by 1,440 head of cattle, and the Castle Valley Ridge is grazed by 236 head of cattle between July 26 and September 30. Private land owned by U. S. Fuel Company is grazed by 200 to 300 head of cattle between May and November. The land managed by the BLM within the permit boundary is grazed. There are four livestock allotments, three for cattle and one for sheep. Total grazing allowed is 650 animal units per month.

Recreational use of the area affected by mining operations consists primarily of hunting and camping. Heavy hunting of elk and mule deer occurs on Gentry Mountain. Camping frequently occurs on Gentry Mountain. There is no merchantable timber although much of the area is covered by Douglas fir, aspen, pinyon pine, and juniper. Land use should remain the same: recreation, grazing, wildlife, and mining. During the last five years, land use within the permit boundary has not changed.

Land capability and productivity before mining has been only slightly reduced compared to the present land capability. Mining activities have proceeded on the current lease areas of the PMC for several decades with only minor effects on productive capabilities in terms of soils, topography, vegetation, or hydrology. The soils indigenous to the area affected by the operations are described in Section UMC 783.21, Soil Resource Information. Vegetation is discussed in UMC 783.19, Vegetation Information. Land productivity in terms of plant products before any mining did not differ greatly from present productivity. Early settlers depended upon range land for grazing sheep, cattle, and horses. Timbering was active, but on a much smaller scale than grazing. Early settlers needed fence posts, corral poles, house logs, and railroad ties.

The land use of the Unit Train Loadout area is that of grazing by domestic livestock and wildlife. Grazing, which is by cattle, is under the control of the BLM and is part of the Wattis Grazing Allotment. The allotment contains approximately 3,500 acres of Public Land with an allocation of about 100 AUM's. This amounts to 35 acres per AUM which reflects the low productivity of the area. Due to steepness of slope and the inherent lack of production on the Badlands type, the actual contribution of this area to the grazing resource is very low. According to BLM, some fence post and cord wood are cut from badlands but, in general, they are not managed intensively for these products. Likewise, the local SCS office describes the Badlands type as not containing a developed soil, but consist of geologic material derived from weathered Mancos shale and sandstone which do not have an agronomic potential for the production of food or fiber. The permit area affected by surface operations and facilities of the underground mine is capable of supporting limited forestry, grazing, and recreational uses. Farming in the area is prohibited by the steep and rocky terrain and the lack of water.

Current and future land use will suit the physical features of the mine plan area, which is mostly steep and rocky. Such land is well suited for management as a multi-use area, and coal mining fits appropriately into

the overall land use scheme. Land productivity data were obtain from USFS and BLM.

Since coal mining was started in 1917, the Lion Coal Company operated Wattis No. 1 and 2 Mines until the end of 1963. There were no coal mining activities from 1964 through 1967. Plateau Mining, Ltd. operated the Star Point No. 1 Mine in the Hiawatha Coal Seam, which was not mined by Lion Coal Company and the Star Point No. 2 Mine in the Wattis Coal Seam previously the Wattis 1 Mine from 1967 through the fall of 1971. United Nuclear Corporation acquired the Star Point Mines in the fall of 1971. The present day modernization of the coal mine started when the Lion Deck Portal Area was expanded in October 1977. United Nuclear Corporation extracted coal through July 21, 1980. Since then, the coal has been produced by PMC. Room-and-pillar mining with continuous mining machines has been used with pillar recovery as mining conditions permit. The room-and-pillar system was the only logical choice for recovering the coal in the old workings and for driving development openings into the virgin areas.

PMC is located in Wattis, Utah, with the mine portals at approximately 8500 feet above sea level. The coal-bearing strata are in the lower 400 feet of the Blackhawk Formation of the Mesa Verde Group. Coal has been extracted from three seams, which, from uppermost to lowermost, are the Wattis, Third, and Hiawatha Seams. When mining began in the early 1900's, entry was made into the Third Seam and coal extracted from it first. Mining was expanded into the Wattis Seam as reserves were depleted. Slopes connected the Wattis Seam with the Third Seam and provided access to the virgin western reserve area.

Besides coal, oil and gas are the known minerals of value in the environs of the permit area. A few wells drilled in a field adjacent to the permit area produced gas and oil from 1924 to 1976. This field is now abandoned and there are no producing wells within the permit boundaries or close by. The one exploration hole sunk on the PMC Permit Area proved to be dry. Thus, no minerals other than coal have been extracted from the permit area.

From 1917 through 1963 approximately 12,000,000 tons of coal were removed from the Star Point Mines by Lion Coal Company. Between 1967 and the fall of 1971 approximately 750,000 tons of coal were extracted by Plateau Mining, Ltd. United Nuclear Corporation as UNC Plateau Mining Company mined approximately 5,000,000 tons of coal between the fall of 1971 and July 21, 1980. PMC has mined approximately 6,000,000 tons between 1980 and 1985.

UMC 783.24 MAPS: GENERAL REQUIREMENTS

THE PERMIT APPLICATION SHALL INCLUDE MAPS SHOWING:

(a) ALL BOUNDARIES OF LANDS AND NAMES OF PRESENT OWNERS OF RECORD OF THOSE LANDS, BOTH SURFACE AND SUB-SURFACE, INCLUDED IN OR CONTIGUOUS TO THE PERMIT AREA;

RESPONSE:

The boundaries of lands and names of present owners of record of those lands, both surface and sub-surface, included in or contiguous to the permit area are presented on Maps 2 and 3, Surface Ownership and Coal Ownership and Cultural Resource Survey Areas.

(b) THE BOUNDARIES OF LAND WITHIN THE PROPOSED PERMIT AREA UPON WHICH THE APPLICANT HAS THE LEGAL RIGHT TO ENTER AND BEGIN UNDERGROUND COAL MINING ACTIVITIES;

RESPONSE:

The boundaries of land within the proposed permit area upon which PMC has the legal right to enter and begin underground coal mining activities are presented in Map 3, Coal Ownership and Cultural Resource Survey Areas.

(c) THE BOUNDARIES OF ALL AREAS PROPOSED TO BE AFFECTED OVER THE ESTIMATED TOTAL LIFE OF THE UNDERGROUND COAL MINING ACTIVITIES, WITH A DESCRIPTION OF SIZE, SEQUENCE AND TIMING OF THE MINING OF SUB-AREAS FOR WHICH IT IS ANTICIPATED THAT ADDITIONAL PERMITS WILL BE SOUGHT;

RESPONSE:

The boundaries of all areas proposed to be affected over the five-year permit term of the underground mining activities are presented on Map 4, 5 and 6, Hiawatha, Third and Wattis Seams Mine Plan.

(d) THE LOCATION OF ALL BUILDINGS IN AND WITHIN 1,000 FEET OF THE PROPOSED PERMIT AREA, WITH IDENTIFICATION OF THE CURRENT USE OF THE BUILDINGS;

RESPONSE:

The location of buildings within or within 1000 feet of the permit area can be seen on Map 44, Surface Facilities (4 sheets) and Map 61 and 62, Subsidence Monitoring Plan.

(e) THE LOCATION OF SURFACE AND SUB-SURFACE MAN-MADE FEATURES WITHIN, PASSING THROUGH, OR PASSING OVER THE PROPOSED PERMIT AREA, INCLUDING, BUT NOT LIMITED TO, MAJOR ELECTRIC TRANSMISSION LINES, PIPELINES, AND AGRICULTURAL DRAINAGE TILE FIELDS;

RESPONSE:

The location of surface and sub-surface man-made features within, passing through, or passing over the proposed permit area are presented on Map 44, Surface Facilities (4 sheets) and Map 61 and 62, Subsidence Monitoring Plan.

(f) THE LOCATION AND BOUNDARIES OF ANY PROPOSED REFERENCE AREAS FOR DETERMINING THE SUCCESS OF REVEGETATION;

RESPONSE:

The location and boundaries of any proposed reference areas for determining the success of revegetation are presented on Map 34, Disturbed Area Vegetation, and Map 36, Corner Canyon Fan Site Vegetation.

(g) THE LOCATIONS OF WATER SUPPLY INTAKES FOR CURRENT USERS OF SURFACE WATERS FLOWING INTO, OUT OF, AND, WITHIN A HYDROLOGIC AREA DEFINED BY THE DIVISION, AND THOSE SURFACE WATERS WHICH WILL RECEIVE DISCHARGES FROM AFFECTED AREAS IN THE PROPOSED MINE PLAN AREA;

RESPONSE:

Because of the remoteness and the limited amount of surface water in and adjacent to the PMC mine plan area, essentially no development of the surface water has occurred except for some stockwatering troughs and some development done in conjunction with runoff control facilities associated with the mine. Surface stream stockwatering rights are generally located along stream reaches and are not point discharges but may continue for miles downstream. Surface stream reaches identified for water right use are shown on Map 32, Surface Water Rights Location.

Discharges from the mine plan area are confined to discharges from one treatment facility (Treatment Facility No. 1) and seven sedimentation ponds located in Sage Brush Canyon (an ephemeral watershed) and one mine discharge located in Mud Water Canyon. The locations of Treatment Facility No. 1 and the seven sedimentation pond discharges are shown on Maps 42 and 43, Surface Water and Sedimentation Control Facilities Maps A and B. The mine water discharge point located in Mud Water Canyon is illustrated on Map 31, Ground and Surface Water Monitoring Stations.

(h) EACH PUBLIC ROAD LOCATED IN OR WITHIN 100 FEET OF THE PROPOSED PERMIT AREA;

RESPONSE:

Each public road located in or within 100 feet of the proposed permit area is shown on Map 44, Surface Facilities (4 sheets).

(i) THE BOUNDARIES OF ANY PUBLIC PARK AND LOCATIONS OF ANY CULTURAL OR HISTORICAL RESOURCES LISTED OR ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES AND KNOWN ARCHAEOLOGICAL SITES WITHIN THE MINE PLAN OR ADJACENT AREAS.

RESPONSE:

There are no public parks or cultural or historic resources listed or eligible for listing in the National Register of Historic Places located within the permit area. Cultural and historic resources of the permit

area are presented on Map 3, Coal Ownership and Cultural Resource Survey Areas.

(j) EACH PUBLIC OR PRIVATE CEMETERY OR INDIAN BURIAL GROUND LOCATED IN OR WITHIN 100 FEET OF THE PROPOSED PERMIT AREA;

RESPONSE:
There are no private cemeteries or Indian burial grounds identified within the permit area.

(k) ANY LAND WITHIN THE PROPOSED MINE PLAN AREA AND ADJACENT AREA WHICH IS WITHIN THE BOUNDARIES OF ANY UNITS OF THE NATIONAL SYSTEM OF TRAILS OR THE WILD AND SCENIC RIVERS SYSTEM, INCLUDING STUDY RIVERS DESIGNATED UNDER SECTION 5(A) OF THE WILD AND SCENIC RIVERS ACT; AND

RESPONSE:
There are no areas within the permit boundary which are units of the national system of trails or the wild and scenic rivers system, including study rivers designated under Section 5(A) of the Wild and Scenic Rivers Act.

(l) OTHER RELEVANT INFORMATION REQUIRED BY THE DIVISION.

RESPONSE:
All other relevant information presented in this permit application is contained on the various maps and figures included in the plan.

UMC 783.25 CROSS-SECTIONS, MAPS, AND PLANS

THE APPLICATION SHALL INCLUDE CROSS-SECTIONS, MAPS, AND PLANS SHOWING-

(a) ELEVATIONS AND LOCATIONS OF TEST BORINGS AND CORE SAMPLINGS;